# AUTOMOTIVE INDUSTRIES

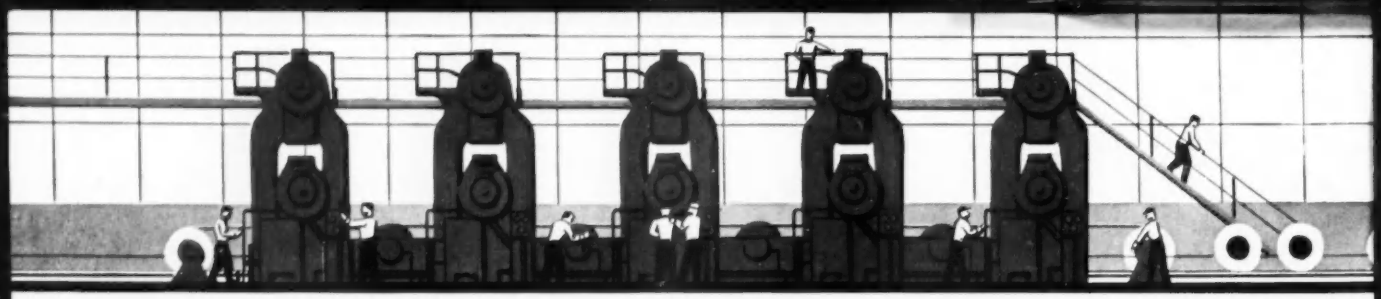
AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

AUGUST 1, 1954

*In This Issue*



A CHILTON PUBLICATION



Now! cut application costs and grease inventories with

# NEW STANOLITH GREASE MP

You need only this *one* grease for many kinds of heavy equipment!

Added high-load carrying capacity!

Resists both water and high temperatures!


Here is a newly formulated grease with such an increase in multi-purpose range that it helps you *cut application costs* and *reduce grease inventories*. Higher oil viscosity and greater extreme pressure properties make it suited for wide use in steel mills, cement mills, rubber mills, mining operations—all other heavy equipment industries.

More than just an "E. P." grease, New STANOLITH MP has all of the outstanding properties of STANOLITH greases: excellent oxidation stability and good mechanical stability. It has extreme water resistance and withstands high temperatures—*it will not thin out*. For better protection of all kinds of heavy equipment, under a wide range of conditions, use STANOLITH Grease MP.

New STANOLITH Grease MP takes its place with famous STANOLITH Greases No. 42 and No. 57 to give you the most versatile collection of multi-purpose greases in modern industry.

**STANDARD OIL COMPANY** *(Indiana)*

*Call your nearby Standard Oil lubrication specialist and let him show you how Standard's "multi-purpose" greases can save you money and help you avoid trouble.*

STANDARD

**Specialists in Heavy-Duty!**

# COTTA REDUCTION UNITS

You can operate one of these Heavy-Duty Cotta Reduction Units continuously in your crane, shovel, rock-crusher, generator, pump, etc., and be sure of getting dependable, trouble-free service over the lifetime of your equipment. Whether you want one, or one hundred, Cotta builds Reduction Gears to your particular requirements . . . in a broad range of ratios . . . with input torques ranging from 150 to 2000 foot pounds. And with Cotta precision-engineering throughout!

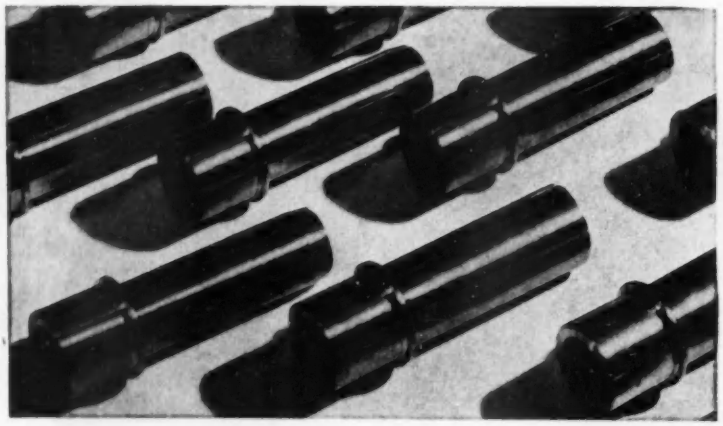
**THIS INFORMATION WILL HELP YOU**

Sent free on request — diagrams, capacity tables, dimensions, and complete specifications. State your problem — COTTA engineers will help you select the right unit for best performance. Write today.

**COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS**

An Assurance of Dependable Service

**COTTA**
**HEAVY-DUTY REDUCTION UNITS**
*"Engineered-to-order"*



**Valve Guides of Ni-Resist**... combine exceptional resistance to corrosion, erosion and heat... along with excellent wear-resistance and machinability. The castings for the "finish-machined" units shown above were produced in Ni-Resist by American Hammered Piston Ring Department, Koppers Company, Baltimore, Md., for Pratt & Whitney Aircraft Division of United Aircraft Corp., East Hartford, Conn.

# Ni-Resist Valve Guides

# *Stand the Gaff*

# Under Severest Operating Conditions

Regardless of drastic increases in exhaust gas temperature, or of corrosive and erosive additives in chemically treated fuels, Ni-Resist® completely meets the need of modern heavy-duty gasoline and Diesel engines, as well as old type units that are "souped up" for increased power ratings.

Use Ni-Resist for valve guides in truck, bus, locomotive and stationary power plant engines... also in marine and reciprocating aeronautical engines. Because Ni-Resist provides the following basic advantages:

1. Resists severe wear by valve stems in motion.
2. Resists both corrosion and erosion by combustion products of chemically treated fuels.
3. Resists heat up to 1400°F., especially in flange portion of valve guides.

In addition, certain special applications take advantage of the fact that the thermal expansion coefficient of Ni-Resist is the same as that of high nickel-chromium austenitic valve materials commonly used in conventional aircraft engines.

*No other cast metal provides such a useful combination of engineering properties.*

Ni-Resist applications include ring groove bands in aluminum pistons, cylinder liners, exhaust manifolds, connector rings, exhaust seat rings and ball joints, water pump bodies and impellers.

Several types of Ni-Resist are available to meet a variety of industrial demands. Get full information... mail the coupon now.

EMBLEM OF INCO SERVICE

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

Please send me booklets entitled, "Engineering Properties and Applications of Ni-Resist" and "Buyers' Guide for Ni-Resist Castings."

Name_____

Title_____

Company_____

Address_____

City_____

State_____

**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 WALL STREET NEW YORK 5, N. Y.

A CHILTON MAGAZINE AI PUBLISHED SEMI-MONTHLY

# AUTOMOTIVE INDUSTRIES

AUGUST 1, 1954 VOL. III, NO. 3



## FEATURES



## NEWS PREVIEWS



## DEPARTMENTS





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# "LONGER TOOL LIFE, BETTER FINISH . . ."

**says Philip Rosenberg, President, Howard Industries, Inc., Buffalo, N. Y.**

Mr. Rosenberg is talking about *Texaco Cleartex Oil*, used for years as cutting coolant and machine lubricant in a battery of Acme Gridleys producing parts for automotive engines and steering mechanisms. Steel worked ranges from C1016 to 4130. He goes on:

"Texaco Cleartex Oil *has given us complete satisfaction. We get longer tool life, better finish, and our machines are still operating with the original factory bearings. We are glad to recommend* Texaco Cleartex Oil *for similar operations.*"

*Texaco Cleartex Oil* is just one of the complete line of *Texaco Cutting, Grinding, and Soluble Oils* designed to help you do all your machining better, faster and at lower cost.

A Texaco Lubrication Engineer will gladly help you make the proper selection and improve the machining in your plant. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.

TEXACO

**TEXACO CUTTING, GRINDING, SOLUBLE AND HYDRAULIC OILS**

# Don't Get Caught Without a Spindle


**Be protected with a SHEFFIELD ADJUSTABLE BALLJET SPINDLE KIT against an accident, an unexpected engineering revision, an oversight in a tool order. You'll be ready, too, to gage those small runs of high precision parts.**

Size Setting Gage

**In 5 minutes you can assemble from the Kit a spindle for any size within a range of one to three inches and set it to size with the Size Setting Gage. Four spindles of various sizes can be placed in use simultaneously.**

## NO MASTER SETTING RINGS NEEDED

Standard Calibrator

To assemble and use these spindles, you need only an air gage and the equipment illustrated in the Kit plus a set of standard gage blocks—nothing else—not even one master setting ring. The air gage is calibrated by using the standard calibrator illustrated.

**PLAY SAFE**—have the Adjustable Spindle Kit on hand for daily use and ready for that emergency which may happen tomorrow.

Call your local Sheffield representative or write for Engineering Data Sheet 119-54. ***Gage Division, The Sheffield Corporation, Dayton 1, Ohio, U. S. A.***

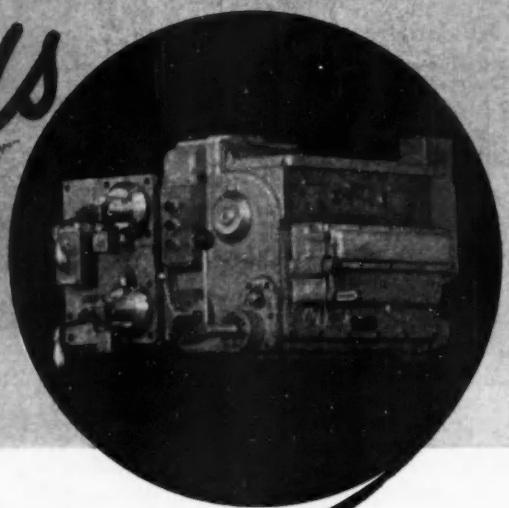
6749

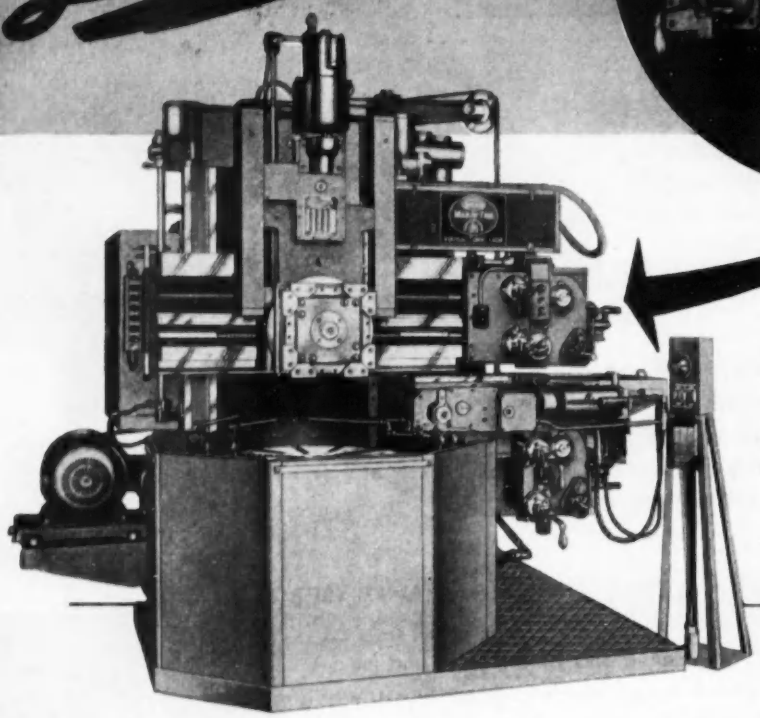
MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

**SHEFFIELD**

# CONCEALED VALUES THAT PAY $ $ $

## Dividends



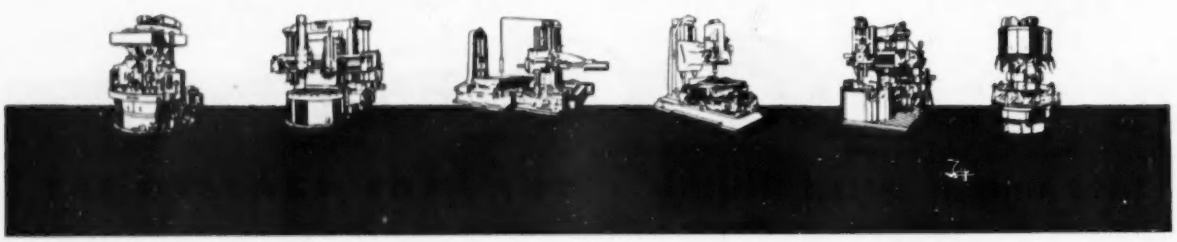


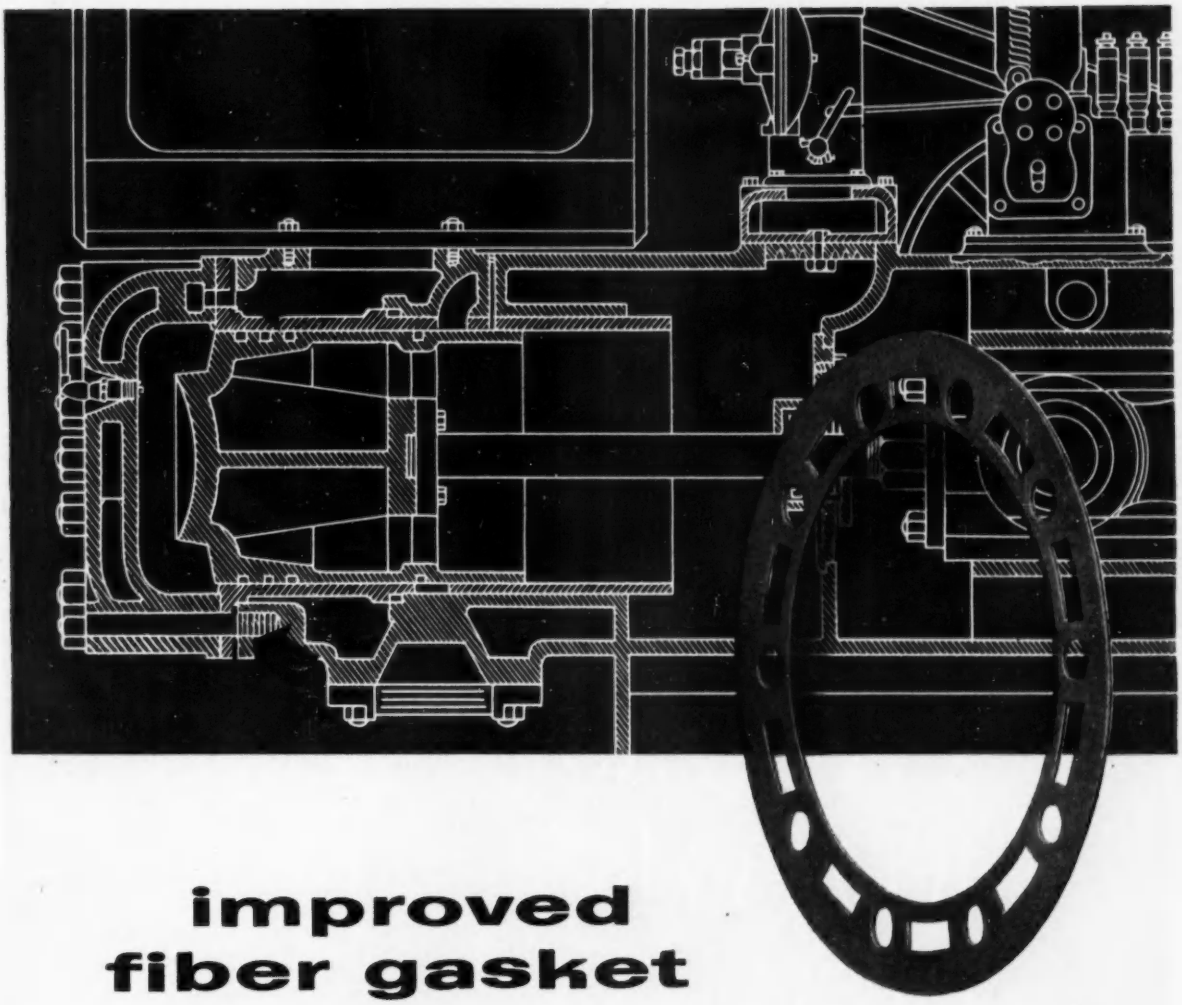
**MAN-AU-TROL CONTROLLER**

Electrical and hydraulic functions combined to initiate and complete a pre-selected sequence of operations including direction and rate of feed, direction of power traverse, indexing of turrets and changing of spindle speeds automatically, accurately and repetitively.

BULLARD

The refinements of design and construction in Bullard Machine Tools incorporate many "concealed values" which provide for ease of operation, cutting time between cuts and on cuts, accuracy in machining repetitive dimensions with less spoilage and minimum maintenance time resulting in higher over-all productive time. . . . . The Man-Au-Trol Vertical Turret Lathe can be controlled either manually or entirely automatically at the operator's discretion to best meet the requirements of the job at hand. For complete details on this versatile machine, call your Bullard representative or write to





# improved fiber gasket

## makes engine re-design unnecessary

Choosing the right gasket material may be a critical factor in the success of a product design, as the manufacturer of an oil field engine discovered.

In his engine, the lateral expansion of the cylinder sleeve tends to force the cylinder head away from the block. Conventional fiber gasket materials lacked sufficient "kickback" to adjust to that expansion. It seemed for a time that this shortcoming would force the engine manufacturer to abandon his design.

Then he tried a new type of fiber gasketing—Armstrong's Accopac®—and the leaks vanished. Since Accopac CN-705 gaskets became standard, not one case of gasket failure has been reported.

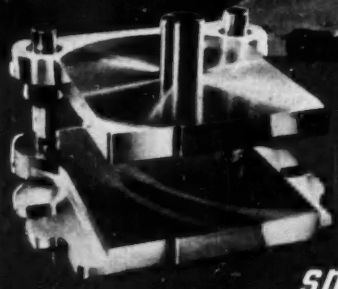
Accopac seals tightly because of the way it's made. A patented beater saturation method blends fiber, cork, and rubber into uniformly strong, homogeneous sheets that are unusually compressible. The latex rubber binder is non-volatile and non-extractable. This makes Accopac remarkably resistant to dimensional change under varying humidity and temperature conditions.

For dependable, low-cost sealing—try Accopac. It's used in everything from pumps and air compressors to aircraft, automotive equipment, and household appliances.

FREE 24-PAGE GASKET MANUAL—See "Armstrong's Gasket Materials" in Sweet's product design file. Contains information on Accopac as well as other types of gasketing materials, plus data on joint and gasket design. For your personal copy, write Armstrong Cork Co., Industrial Div., 7008 Imperial Ave., Lancaster, Pa.

# ARMSTRONG'S ACCOPAC

At Danly's Chicago Plant . . . final broaching to assure accurate sizing and parallelism of guide post and bushing holes



# World's fastest die set service speeds up your tooling program

DANLY

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue
Chicago 50, Illinois

At a Danly Branch Plant . . . complete stocks of die set components ready for assembly to your order

***CHICAGO** 50
2100 South Laramie Avenue
***CLEVELAND** 14
1550 East 33rd Street
***DAYTON** 7
3196 Delphos Avenue
***DETROIT** 16
1549 Temple Avenue
***GRAND RAPIDS**
113 Michigan Street N.W.
**INDIANAPOLIS** 4
5 West 10th Street
***LONG ISLAND CITY** 1
47-28 37th Street

FAST, NATIONWIDE DELIVERY FROM THESE BRANCHES

Danly's new, faster service starts at the main Danly Plant in Chicago where two unique, high-speed, mass production lines are devoted exclusively to the manufacture of interchangeable, precision die set parts. Stocked by Danly Branch Plants in major toolmaking centers, these interchangeable parts are quickly assembled to make up the size and type of die set you need—and delivered to you only a few days after your order is received. Make a note right now of the Danly Branch nearest you from the list given on this page. Next time you need die sets, give your Danly Branch a call. See how they can meet your needs from stock . . . and save you time with fast, local service.

***LOS ANGELES** 54
Ducommun Metals & Supply Co.
4890 South Alameda
**MILWAUKEE** 2
111 East Wisconsin Avenue
***PHILADELPHIA** 40
511 W. Courtland Street
***ROCHESTER** 6
33 Rutter Street

*Indicates complete stock*

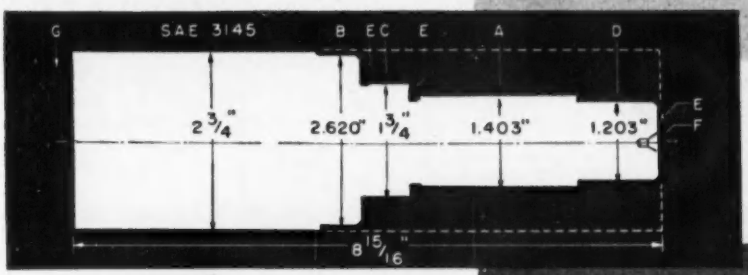
# This is the difference High Velocity Turning makes

**IN 1950** this job took...

**12.40 min.**

FLOOR TO FLOOR

A. Turn 489 RPM — .011 feed
B. Turn 340 RPM — .022 feed
C. Turn 489 RPM — .011 feed
D. Turn 489 RPM — .011 feed
E. Face end, shoulders & neck 489 RPM — .0055 feed
Chamfer
F. Center drill
G. Cut off 82 RPM — .0035 feed H.S.S.




**IN 1954** this same job takes...

**5.40 min.**

FLOOR TO FLOOR

A. Turn 694 RPM — .022 feed
B. Turn 694 RPM — .022 feed
C. Turn 694 RPM — .022 feed
D. Turn 694 RPM — .022 feed
E. Face end, shoulders and neck — 694 RPM — .055 feed
Chamfer
F. Center drill
G. Cut off 489 RPM — .0025 feed

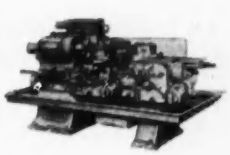
**J & L TURRET LATHES GIVE...**

**MORE Ease of Operation**
**MORE Power Transmission**
**MORE Rigidity**
**MORE Accurate Stops**
**MORE Efficient Lubrication**
**MORE Coolant on Cutting Tools**
**MORE Accurate Results**

Visitors who attend J &L's periodic "Production Studies" Seminars see this job turned out in just 5.40 min. on a Jones & Lamson #7A Universal Turret Lathe.

Only with lathes like this, built with plenty of power and the beef to back it up, can your shop take full advantage of the quality, productivity and lower costs offered by High Velocity Turning.

*This job is one of the many turned at high speeds on our production line. Come to Springfield and see for yourself. At any rate, send for catalogs #101-A and #102.*

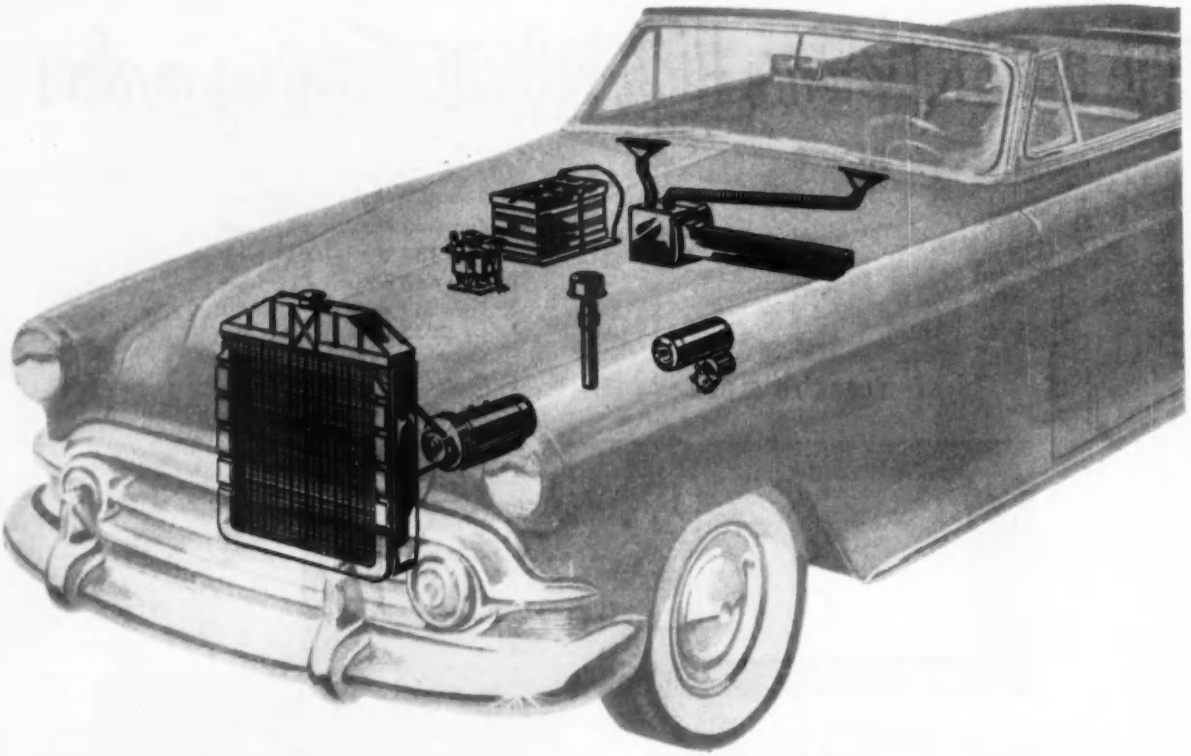


# JONES & LAMSON

*Machine Tool Craftsmen Since 1835*

JONES & LAMSON MACHINE CO., 523 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

J&L MACHINE TOOL DIV.



# *from Hydrazine, improved soldering fluxes*

A remarkable new series of soldering fluxes has been developed by McCord Corporation, one of the largest builders of automotive radiators, refrigeration and air conditioning surfaces, that makes possible greater economy and efficiency in production of soldered components.

Based on compounds of hydrazine, these fluxes, called CORONIL, are non-corrosive and can be used without hazard. They remove oxides and other films from most of the commercially used metals such as copper and brass—as well as others—to permit more effective work and fewer rejects. Currently, these hydrazine-based CORONIL soldering fluxes are being successfully applied in the manufacture of automotive radiators and other heat exchangers, parts for the electrical and electronic industries, carburetor floats, oil strainers, and various other products where effective non-corrosive soldering is essential.

For additional information on hydrazine-based soldering fluxes, call your nearest Mathieson office or write today.

MATHIESON

**MATHIESON CHEMICAL CORPORATION**
Baltimore 3, Maryland

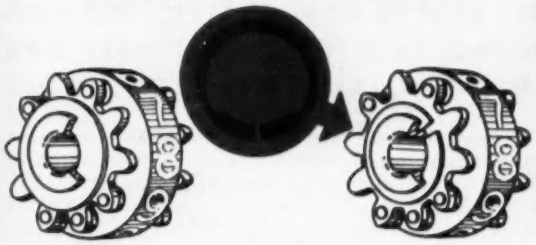
2503

# Waldes Truarc rings replace old-fashioned fasteners... save assembly time...end scrap loss...increase operating efficiency

## This is the Monroe Calculator

...precision-engineered business machine made even more efficient, and less costly to manufacture through the use of Waldes Truarc Retaining Rings.

## Multiplier Dial Assembly



**Old Way.** One-piece assembly was spun together. Spinning operation was costly, resulted in high scrap loss.

**Truarc Way.** Two-piece assembly is held together by one Truarc Ring (series 5100). Rejects: practically zero.

## Electric Motor Governor

**Old Way.** Collector Disc assembly was formerly riveted, requiring skilled labor. Riveted Collector Disc could not be removed in the field.

**Truarc Way.** Truarc Ring (series 5100) replaces rivets, saves labor, material...improves Collector action. Collector Disc is easily replaced.

## Intermediate Gear Shaft

**Old Way.** Washer riveted on end of assembly for zoning control. Costly, troublesome, hard to obtain critical zoning required.

**Truarc Way.** Truarc E-Ring (series 5133) cuts assembly time, virtually eliminates rejects and final assembly and zoning problems.

Monroe Calculating Machine Company, Orange, N. J. uses various types and sizes of Waldes Truarc Retaining Rings. Use of Truarc has helped eliminate scrap losses, saved on material and labor, and resulted in increased operating and servicing efficiency of the product. Monroe plans to use Truarc Rings for every possible fastening operation on their entire line!

You, too, can save money with Truarc Rings. Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better, more economical job. Waldes Truarc Rings are precision-engineered...quick and easy to assemble and disassemble.

Find out what Waldes Truarc Retaining Rings can do for you. Send your blueprints to Waldes Truarc Engineers for individual attention, without obligation.

SEND FOR NEW CATALOG

**WALDES**

# TRUARC

REG. U. S. PAT. OFF.

**RETAINING RINGS**

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS AND PLIERS ARE PROTECTED BY ONE OR MORE OF THE FOLLOWING U. S. PATENTS: 2,383,947; 2,383,948; 2,410,052; 2,420,921; 2,420,341; 2,439,785; 2,441,840; 2,459,165; 2,483,580; 2,483,305; 2,487,902; 2,487,903; 2,491,306; 2,509,091 AND OTHER PATENTS PENDING

**For precision internal grooving and undercutting...Waldes Truarc Grooving Tool!**

AY084

**Waldes Kohinoor, Inc.,** 47-16 Austel Pl., L. I. C. 1, N.Y.

Please send me the new Waldes Truarc Retaining Ring catalog.

*(Please print)*

*Name* .....

*Title* .....

*Company* .....

*Business Address* .....

*City* ..... *Zone* ..... *State* .....

# New General Electric heavy-duty press motor requires less maintenance, reduces downtime

## NEW VENTILATION SYSTEM, RUGGED CONSTRUCTION ASSURE LONGER LIFE WITH G-E TOTALLY ENCLOSED MOTOR

The new General Electric Type KRX induction motor, designed specifically for punch presses, requires less maintenance and no troublesome accessories. Because the KRX is a true totally enclosed fan-cooled motor, there are no filters to change or clean, no separate blowers necessary. You can install it and forget it!

**BUILT TO GIVE YEARS OF SERVICE** without major maintenance, this motor is industry's toughest press motor. Longer motor life is assured for three reasons:

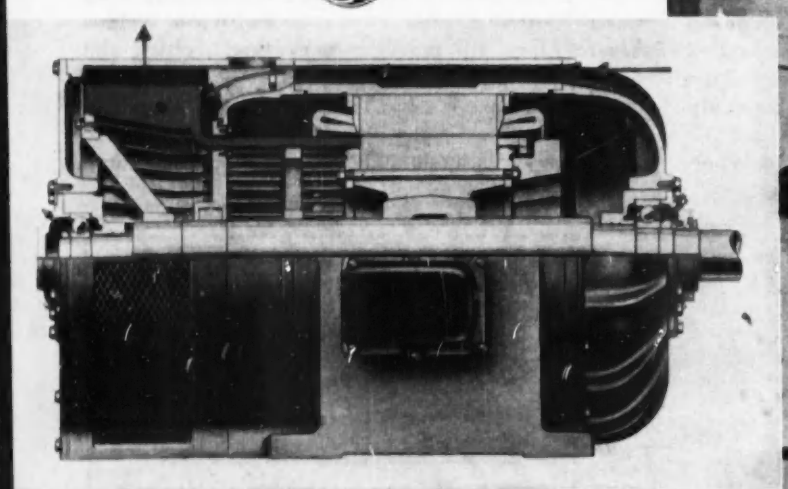
**1** Insulation is less susceptible to damage by overload because rotor heat, normally generated inside the motor enclosure, is dissipated externally by a highly-effective radial fan.

**2** Positive totally enclosed construction and rotating labyrinth seals protect the motor from dirt and the oil-laden air of press rooms.

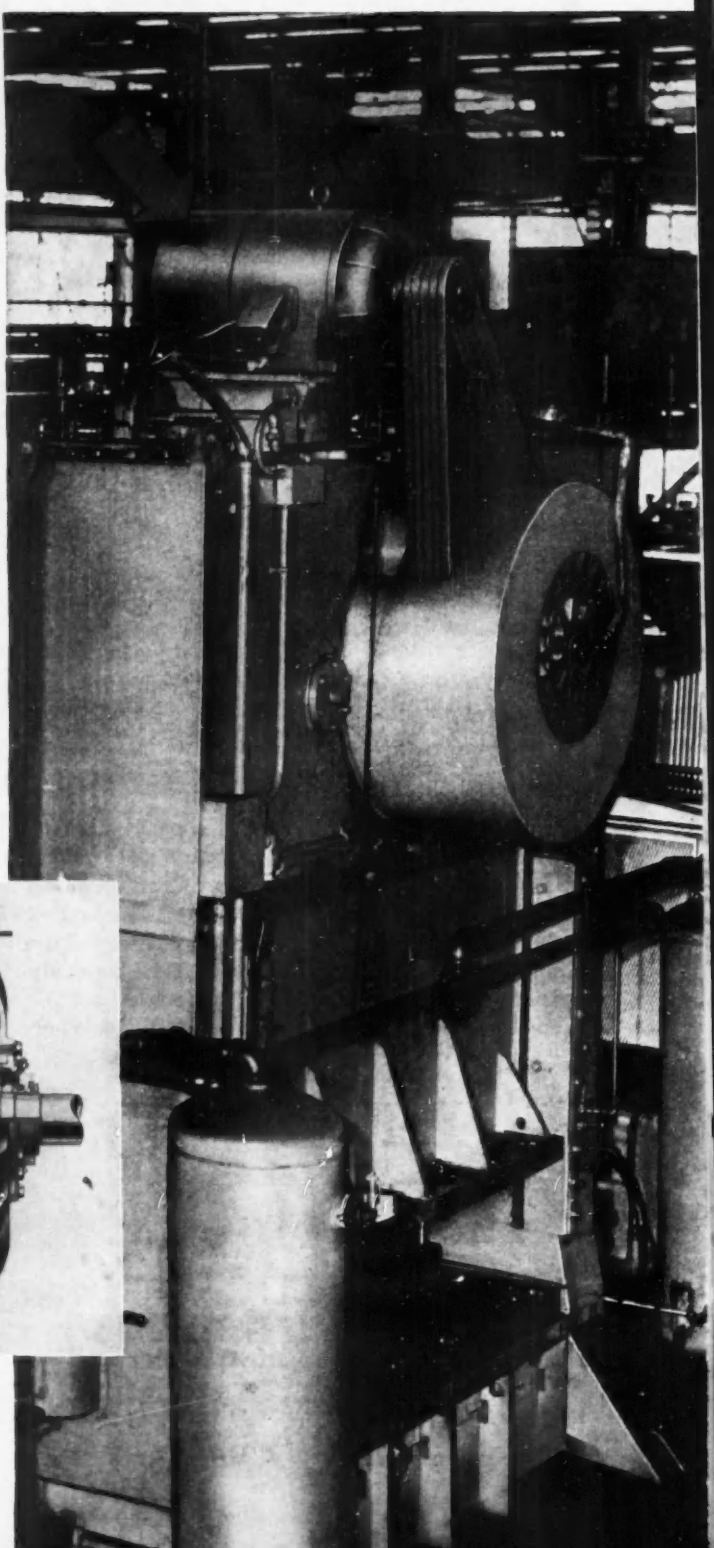
**3** Rugged one-piece, cast-iron frame, rigidly bolted end shields, and sturdy rotor construction provide protection against the shock, vibration, and abuse encountered in press work in the automotive and metal-working industries.

**FOR MORE INFORMATION** on General Electric Type KRX motors consult your G-E Sales representative, or write for Bulletin GEA-5968 to General Electric Co., Section 830-10, Schenectady 5, New York.

GENERAL ELECTRIC



**EFFECTIVE COOLING SYSTEM** of KRX motor is indicated by arrows showing passage of air across motor and fan blades. Bulk of rotor heat is built up in external fan ***outside*** stator assembly.



*Are You Still Featuring*

# DAVENPORTS-ON-WHEELS?

## No Need To!

Bringing the parlor to the open road was once the height of luxury. But in today's sleek new cars, sofa-like seats–for all their new springing and styling – are hangovers from the past. They're out of key with modern production economies, out of line with modern space requirements, out of step with modern tastes–*and completely unnecessary!*

Why? Because AIRFOAM is not "just another" cushioning material. It's a new way to design interiors! AIRFOAM creates production short cuts all its own, replaces costly and bulky springings, makes the smartest custom effects simple premolding operations!

*And what a space-saver* AIRFOAM *can be!*

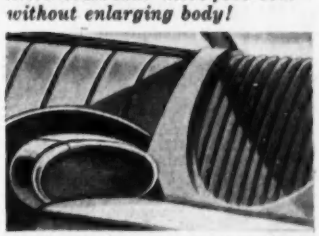
Design-wise, production-wise, you'll be way ahead–once you use AIRFOAM for what it is–a *new* material with *new* and unique advantages to be exploited in *new* and exciting ways!

That is precisely what today's most successful *furniture* manufacturers are doing. Should the automotive industry be far behind?

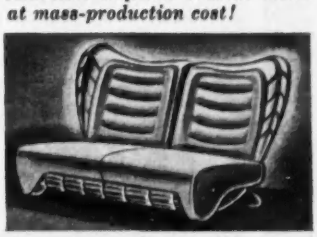
AIRFOAM design engineers are right at your elbow. Write or phone Goodyear, Automotive Products Dept., Akron 16, Ohio.



AIRFOAM *saves precious space! More headroom–more footroom–without enlarging body!*



AIRFOAM *imparts custom looks at mass-production cost!*



AIRFOAM *makes exciting new seating ideas practical!*

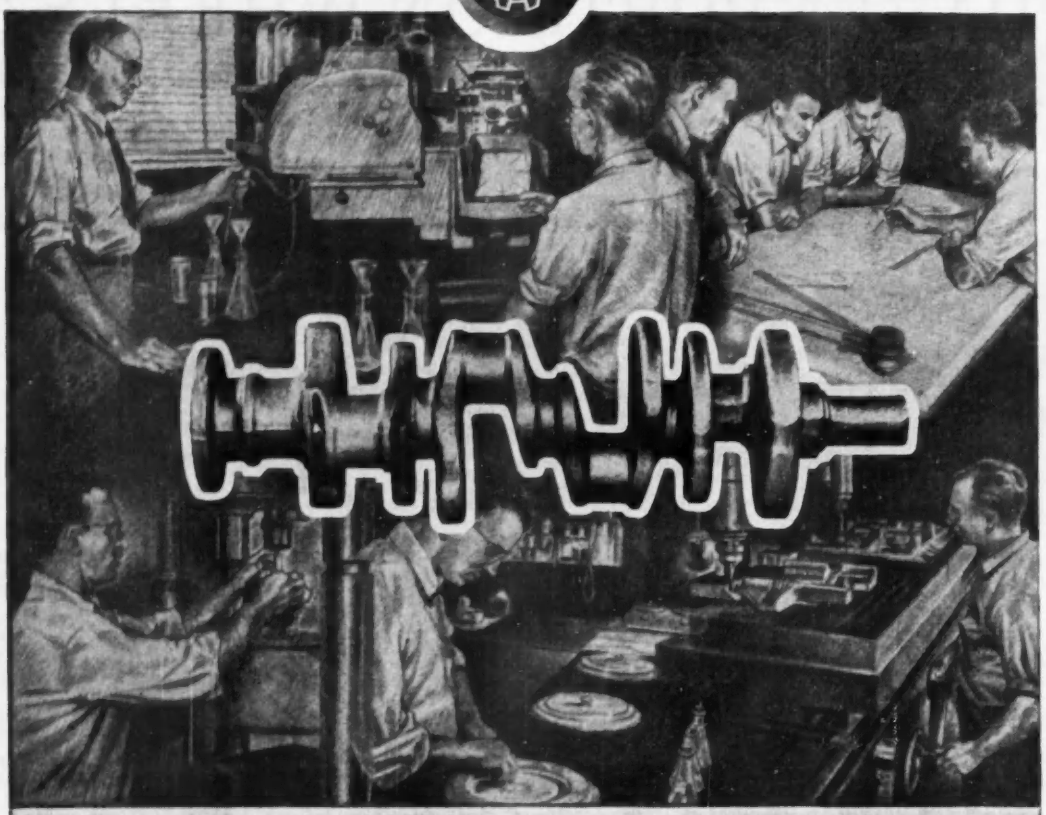

AIRFOAM *can give you a sales-building lead on the field!*

***More AIRFOAM in your line–means more names on the dotted line!***

**Airfoam** MADE ONLY BY **GOODYEAR**

THE WORLD'S FINEST CUSHIONING

Airfoam—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



The crankshaft in the modern V-8 engine requires the ultimate in forging technique. Today's high compression engines, with continually increasing horsepower, further emphasize the importance of forging quality.

Wyman-Gordon technical know-how assures quality essential for maximum physical properties, uniform machinability and balance control . . . crankshaft forging specialists since the introduction of the internal combustion engine.

# WYMAN-GORDON

Established 1883

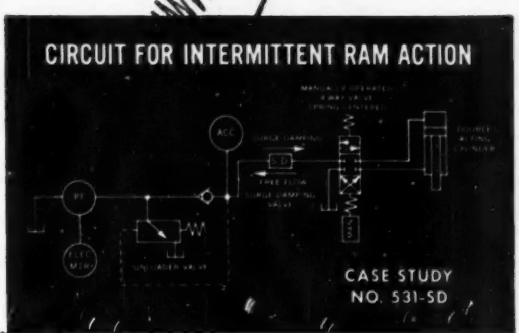
FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER, MASSACHUSETTS

HARVEY, ILLINOIS DETROIT, MICHIGAN

# Protects hydraulic circuits


ACTUAL SIZE




**PUMPS • CONTROLS**
**MOTORS • PRESSES**

## Denison Surge Damping Valve prevents hydraulic shock... eliminates damage to fittings, lines, seals and equipment

Sudden starting, sudden release of high pressure into a low pressure area, or reversal of flow causes a hydraulic surge as damaging to a circuit as blows from a hammer.

The Denison Surge Damping Valve converts the hydraulic surge into a smooth, gradually accelerated flow of fluid power. A hydraulically unbalanced reaction flow control in the valve causes the valve to open slower as the intensity of the surge increases.

Lightweight and easy to install, the Denison Surge Valve can be used on any circuit up to 5000 psi. Requires no adjustment . . . interferes in no way with the efficiency of the circuit.

The circuit shows a Denison Surge Damping Valve preventing hydraulic shock when stored-up energy in an accumulator is released. For a bulletin on the surge valve, write to: THE DENISON ENGINEERING COMPANY, 1212 Dublin Road, Columbus 16, Ohio.

**DENISON**
TRADE MARK
*Hydr* **OIL** *ics*

# 70 SIZES

## of MALLORY

## Silver Rivet Contacts

### Stocked for Immediate Delivery

If you use fine-silver headed rivet contacts, you can save the time of designing, tooling and producing "specials", by ordering from Mallory's standard stock list. Many manufacturers have already found this a time-saving, economical way to obtain contacts in production lots, for experimental use, and for pilot runs or job orders.

The 70 different contacts that Mallory carries in stock—ready for immediate shipment—represent the types and sizes most commonly used in thousands of existing applications. Included are both flat and radius-faced designs.

For the new equipment you may be designing, it will pay you to use Mallory standard rivets as a "preferred list" that will assure you prompt delivery when you go into either pilot or full-scale production. It will pay you, too, to check through this standard list for sizes applicable to the equipment which you are now manufacturing. You will probably find a standard size that is readily applicable to a contact you may now be ordering on a special basis.

Our new folder 3-13A lists complete dimensions, part numbers and prices of Mallory standard stock silver rivet contacts. Write for your copy today.

**FOR UNUSUAL REQUIREMENTS**

When design requirements call for a contact not included in the standard stock program, Mallory engineers will be glad to lend expert assistance in recommending special designs . . . and to manufacture contacts or complete contact assemblies in our efficient production facilities.

***Expect more...***

***Get more from MALLORY***

**Serving Industry with These Products:**

**Electromechanical**—Resistors • Switches • Television Tuners • Vibrators
**Electrochemical**—Capacitors • Rectifiers • Mercury Batteries
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P.R. MALLORY & CO. Inc

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

**modernizing?**

*give new equipment the instrumentation it deserves*

WHEN you're planning to install new process equipment, plan to take advantage of the full potential of modern methods of measurement and control. It's the sure way to get top value for your modernization investment . . . for the improvements in production economy, quality and versatility possible with today's new process equipment depend increasingly on control instrumentation.

Here are some specific suggestions for your own modernization plans:

**New equipment should be designed for control.** Instrumentation is not merely a necessary appendage. It's a vital, integrated part of the process itself. Control design goes hand in hand with process design. Honeywell's experienced application engineers will be glad to cooperate with your own staff or your consulting firm, to recommend ways to obtain the full benefit of modern instrumentation.

**Each instrument should fit its function.** This may seem obvious—but all too often, instrumentation has been stretched or squeezed to fit the application. In Honeywell's exceptionally wide line, you'll find instrumentation with exactly the right performance . . . at the right cost . . . for your process.

A talk with your nearby Honeywell field engineer will give you a detailed picture of what instrumentation can mean in your modernization program. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

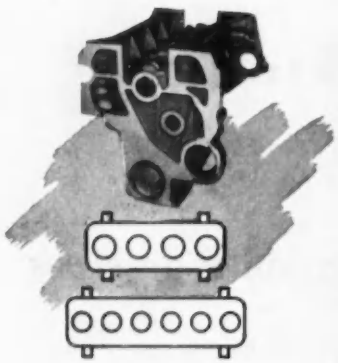
MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

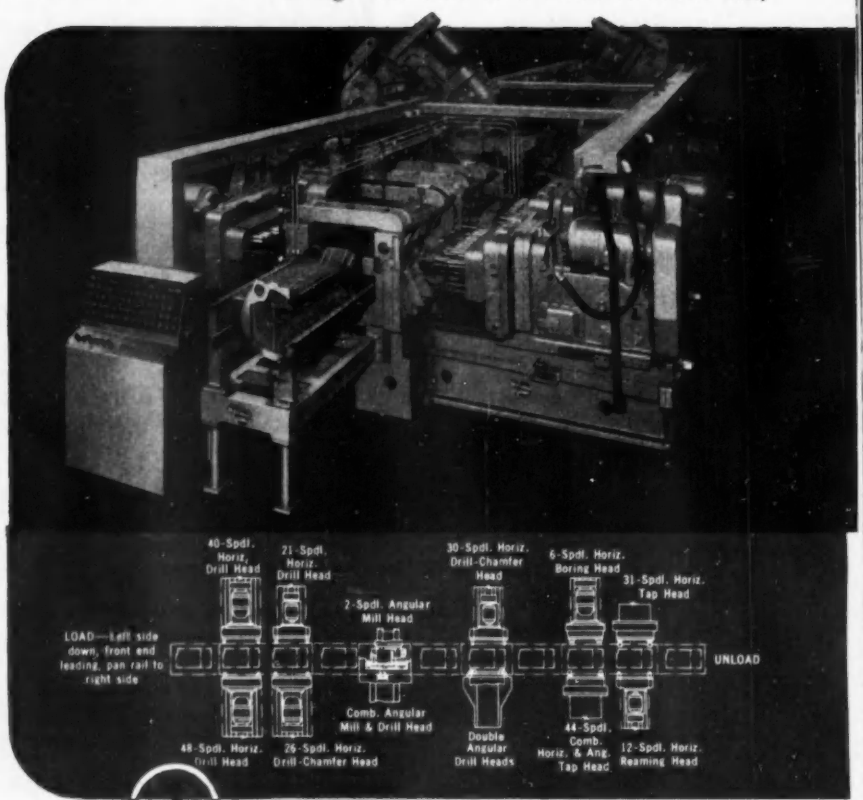
*First in Controls*

# DUAL-PURPOSE SPECIALS

● Here's another outstanding example of how W. F. & John Barnes Coordinated Creative Engineering and Manufacturing Service has helped cut production costs . . . this time for a well-known farm equipment manufacturer. These three special machines have been ingeniously designed to machine TWO SIZES of tractor engine blocks . . . double-duty performance that not only means a lower original investment, but also simplifies tooling, reduces floor space requirements, and increases over-all production efficiency. Careful planning of tooling and machine components holds change-over time to a minimum . . . in fact,



Both 4 and 6-cylinder blocks are processed on the same Barnes' Special Machines.




**Barnes 11-Station Progress-Thru Machine completes drilling, tapping, and milling operations on the 4 and 6-Cylinder Diesel Engine Blocks. Bushing plates, guide rails, head stops, transfer pusher fingers, and other machine components are quickly adjustable to handle both block sizes.**

## SAVE TIME WITH BARNES' COORDINATED 6-POINT BUILDING SERVICE

"Shopping around" is often a costly, time-consuming task, and all too often the results are disappointing . . . that's why Barnes offer a complete machine tool building service from *one convenient source* . . . it saves time and cuts costs because all the work is coordinated in one plant. Barnes' service includes:

**1** **SPECIALIZED MANUFACTURING FACILITIES**—75-year background, large well equipped plant efficiently tooled to build high production machines.

**2** **SPECIAL HYDRAULIC EQUIPMENT**—designed and built to meet JIC standards. Individually engineered units assure smooth, dependable actuation for every requirement.

**3** **SPECIAL ELECTRICAL EQUIPMENT and CONTROLS** — individually designed and built for maximum safety and ease of control, with circuits that assure the most dependable coordination of all machine functions.

**4** **SPECIAL GAUGES, FIXTURES, TOOLS**—designed for each individual machining problem, assure accuracy of operations at high production speeds.

**5** **SPECIAL HANDLING AND CONVEYOR EQUIPMENT**—designed and built to reduce work handling, effect maximum safety and efficiency.

**6** **COORDINATED DESIGN AND ENGINEERING**—Mechanical, Hydraulic, Electrical, Process, Tool, and Fixture Engineers work together at Barnes. Team-work solves complex problems quickly.

W. F. & JOHN BARNES

*Builders of Better Machines Since 1872*

*Multiple Spindle Drilling • Boring*

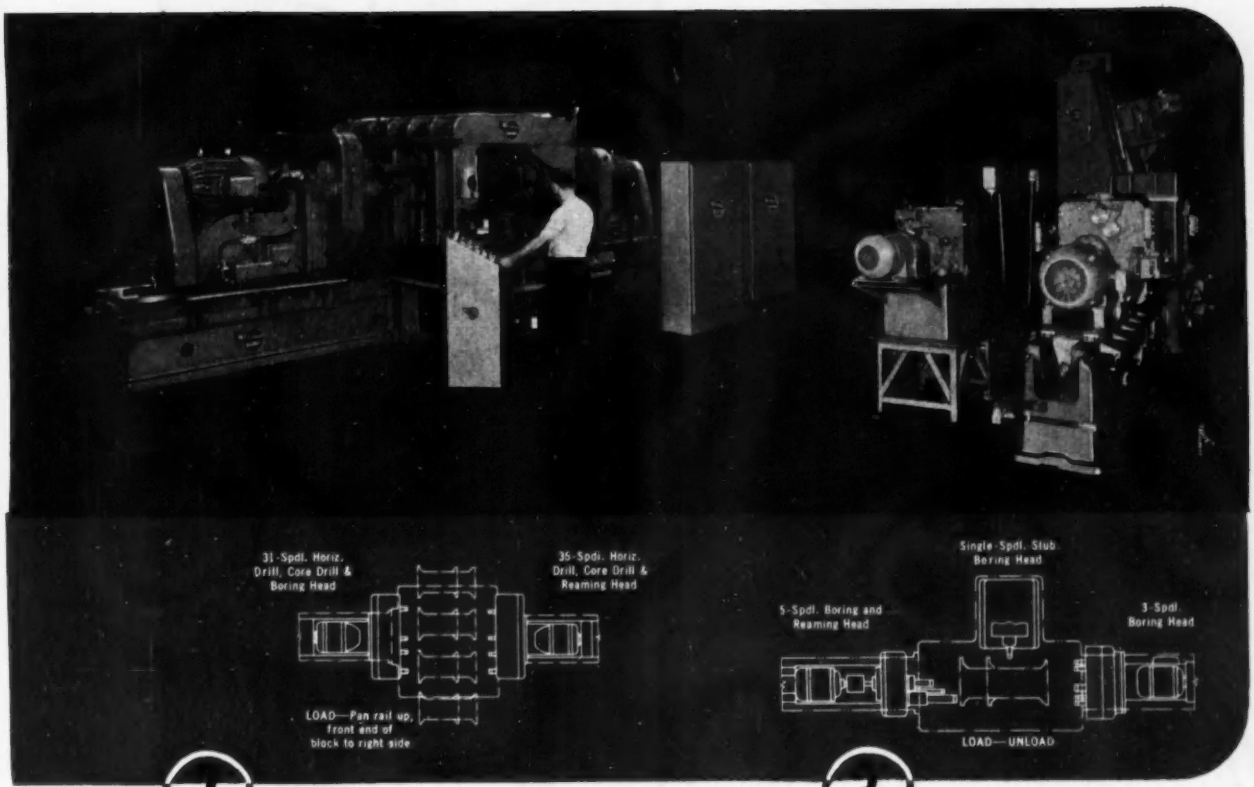
# • MACHINE BOTH 4 AND 6 CYLINDER ENGINE BLOCKS

much of the tooling is common to both block sizes and does not require changing. Bushing plates, guide rails, head stops, and transfer pusher fingers quickly and easily adjust to accommodate for variations in the two block designs. Where tooling changes are required, easy accessibility and quick conversion and set-up features speed the change-over.

**OVER 75 YEARS OF MACHINE TOOL BUILDING EXPERIENCE**

This unusual application is only one of many produced by Barnes . . . the result of over 75 years of accumulated knowledge in the highly specialized machine tool field. Creative skills, plus complete and extensive building facilities, assure you of machines possessing maximum capability for lowering production costs and improving product quality.

***ASK FOR AN ANALYSIS OF YOUR PRODUCTION METHODS... YOUR PROBLEMS WILL RECEIVE EXPERT AND INDIVIDUAL ATTENTION***




**2** **Barnes Special 4-Station Progress-Thru Machine completes drilling, boring, and reaming on the blocks. Here again, adjustable features are built in to compensate for the two block sizes. Electrical interlocks on these machines prevent accidental tool damage during change-over. Idle stations are included for future tapping operations.**

**3** **Special 3-Way Cam and Crank Boring Machine precision bores both block sizes. Adjustment features are similar to the preceeding machines. All units are electrically controlled for automatic cycle sequence with push-button operation.**

*Write Today* **FOR YOUR COPY**
of "Coordinated Machine Engineering"—a 32-page booklet of automation equipment ideas.

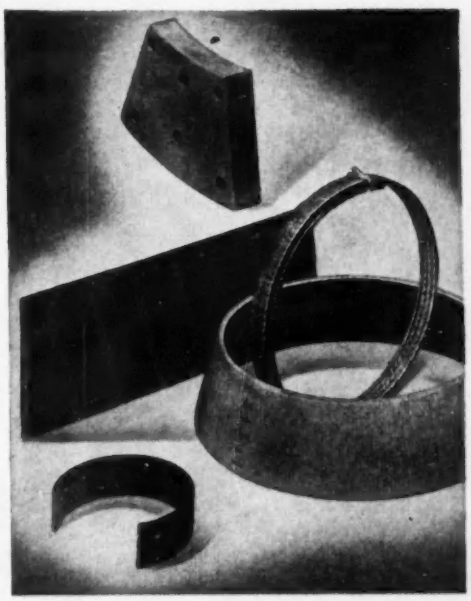
**W. F. & JOHN BARNES COMPANY**
**312 SOUTH WATER STREET, ROCKFORD, ILLINOIS**
*Tapping Machines • Automatic Progress-Thru and Transfer Type Machines*

A most important advance in railroad equipment, this anti-sway bar or snubber fills a long-felt need in both passenger car and freight car operation. Raybestos-Manhattan supplies the friction-faced shoes providing the desired stable friction, noiseless operation, and long life. To develop these characteristics, R/M used a special semi-metallic material and its laboratories simulated actual road conditions. The friction-faced shoes in a snubber satisfactorily completed over 4,500,000 test cycles.

# THE TRADE-MARK THAT SPELLS PROGRESS IN FRICTION MATERIAL DEVELOPMENT!

If you have a problem in design or manufacture that involves friction materials, talk to Raybestos-Manhattan, world's largest maker of friction materials. Working in both the asbestos and the metal fields, R/M is in the right position to give you impartial advice.

R/M's extensive experience with woven and molded asbestos, semi-metallic materials, and sintered metals has proved invaluable to countless manufacturers in all kinds of industries. So your problem could very well be one that R/M has already studied and solved. In any case, get to know your R/M representative. Call him in and take advantage of R/M's vast research production facilities.



**R/M's complete line of friction materials includes woven and molded asbestos parts in the form of blocks, segments, discs, cones, collars, and many special shapes.**

*Write for your copy of the R/M Engineering Bulletin. It describes and illustrates many R/M friction materials for aviation, agriculture, the automobile industry and others*

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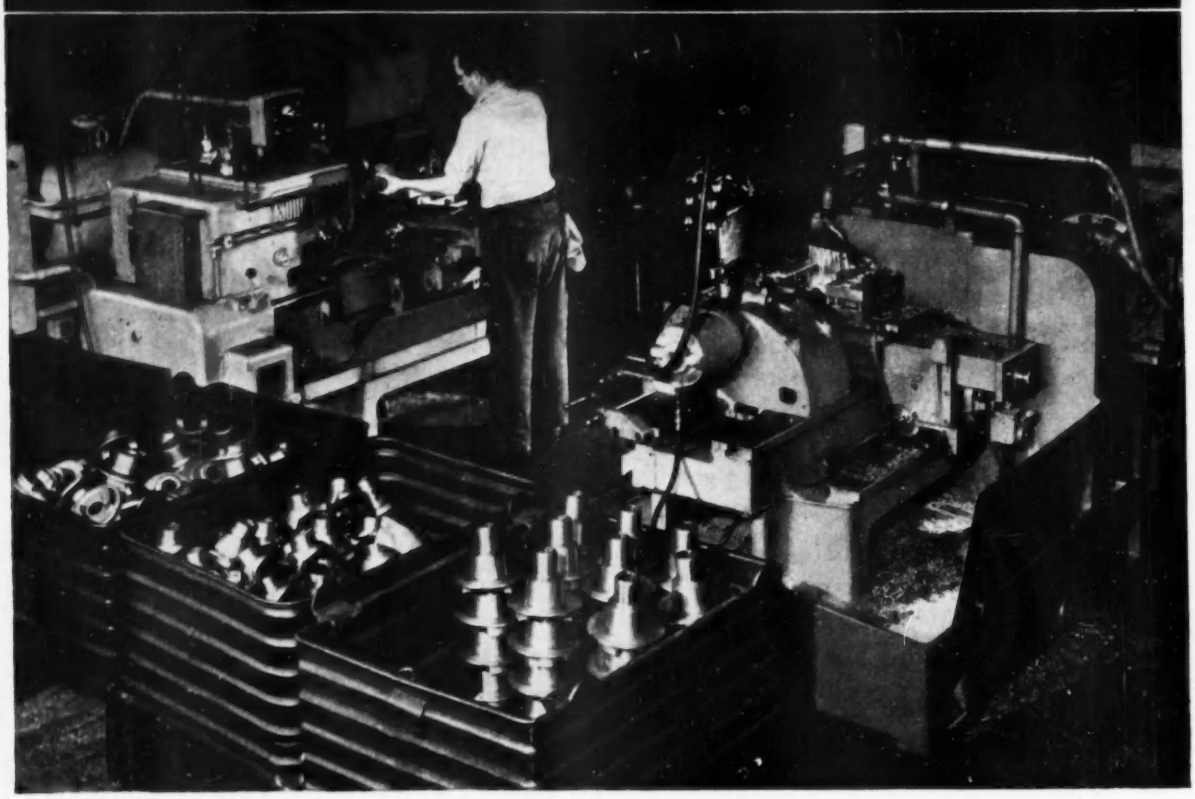
MOST AT FRICTION

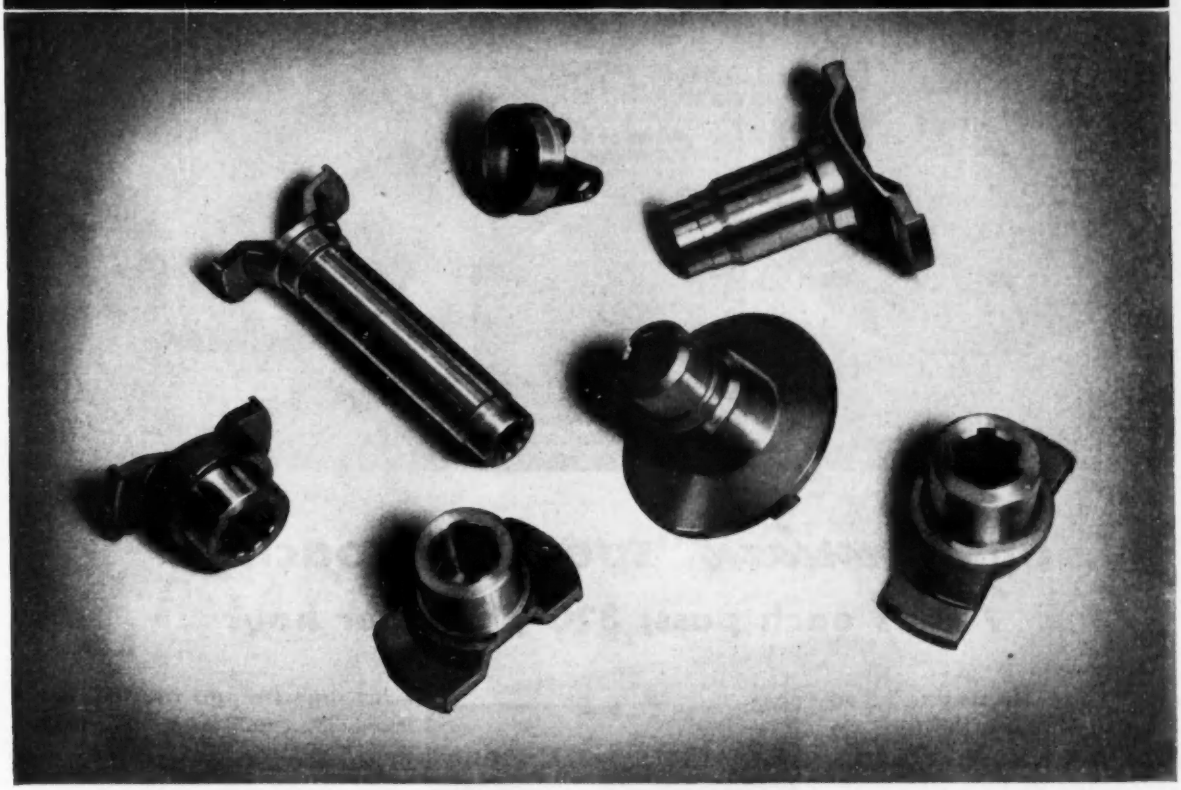
# Production Increased



## ...with SUNDSTRAND Automatic Lathes

Two Sundstrand Model 8A Automatic Lathes are used for turning fitting yokes, slip yokes and weld yoke parts for the Mechanics Universal Joint Division, Borg-Warner Corp. of Rockford, Illinois. Use of these two Sundstrands has increased production over five times compared to former method. In addition to the production increase, tool life and finish has been improved.

# More Than 5 Times



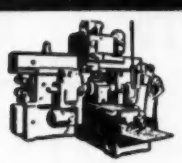
## 10 Different Jobs Turned In Lot Sizes of 500

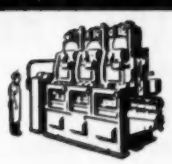
Operation for these yoke parts consists of turning the O. D. complete, using carbide tipped tools. Changeover time is *25% less* than with former method. One operator handles both machines. This is only one of many installations wherein Sundstrand Automatic Lathes have increased production. If you have turning operations, call in a Sundstrand engineer and get an "Engineered Production" analysis. There is no obligation for this service.

## Additional Data

ADDITIONAL DATA on the complete line of Sundstrand Automatic Lathes is included in this new 32-page booklet. Write for your copy today. Ask for bulletin 246.

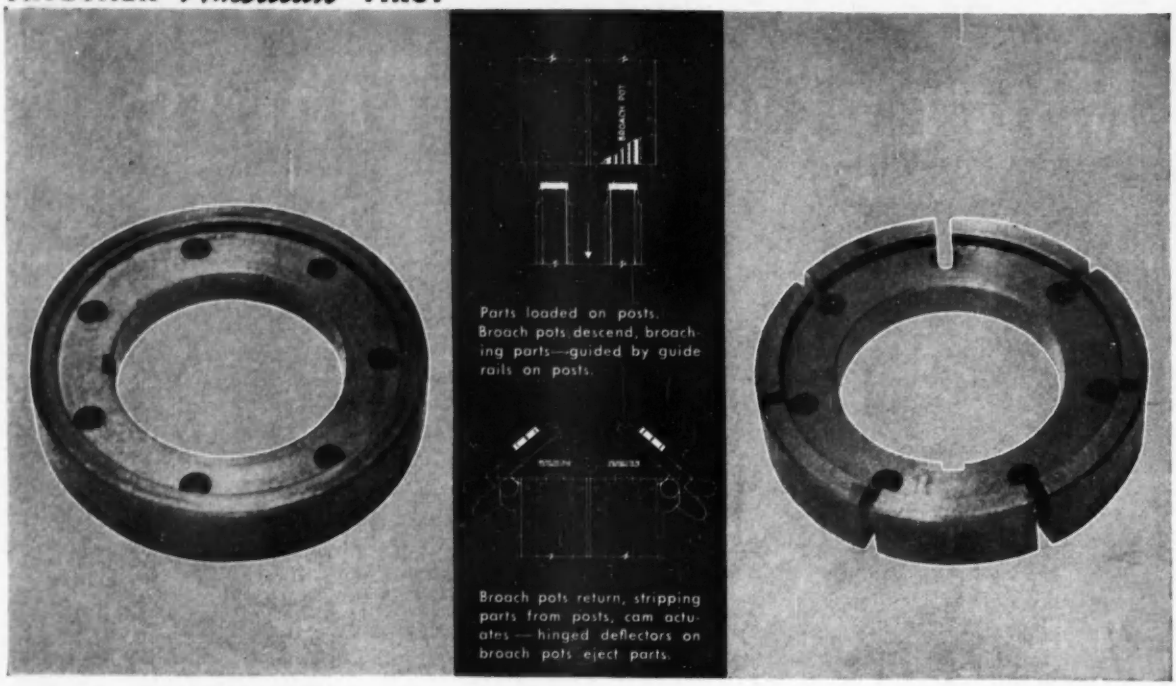
TRIPLEX RIGIDMILS | SPECIAL MACHINES





**SUNDSTRAND**
**Machine Tool Co.**
2571 Eleventh St. • Rockford, Ill., U.S.A.

**ANOTHER *American* FIRST**

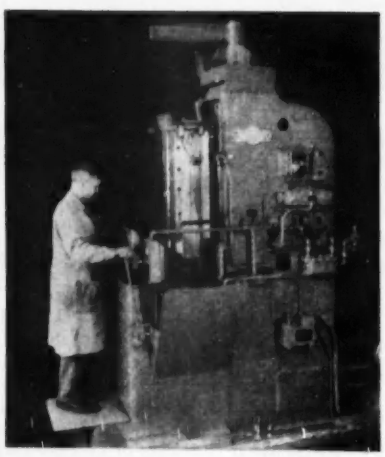



# an *American* "special" broaches

## 7 slots each pass; 320 parts per hour

Seven external slots are broached on a pump rotor part by this American special two-station 42" stroke, 10-ton broaching machine. Fixtures are designed as posts fixed to the machine base and contain guides for guiding the moving broach pots during the machine stroke.

The operation is very simple—the operator loads two parts and starts the broaching cycle. Safety wedges, which prevent the broach pots from moving down while the operator loads, retract and the broach pots move down broaching the parts. On the return stroke the ejector mechanism strips the parts from the posts and then flips the parts to the side as the broach pots move up. The operator reloads and the cycle repeats, producing 320 parts per hour, when operating at 100% efficiency.

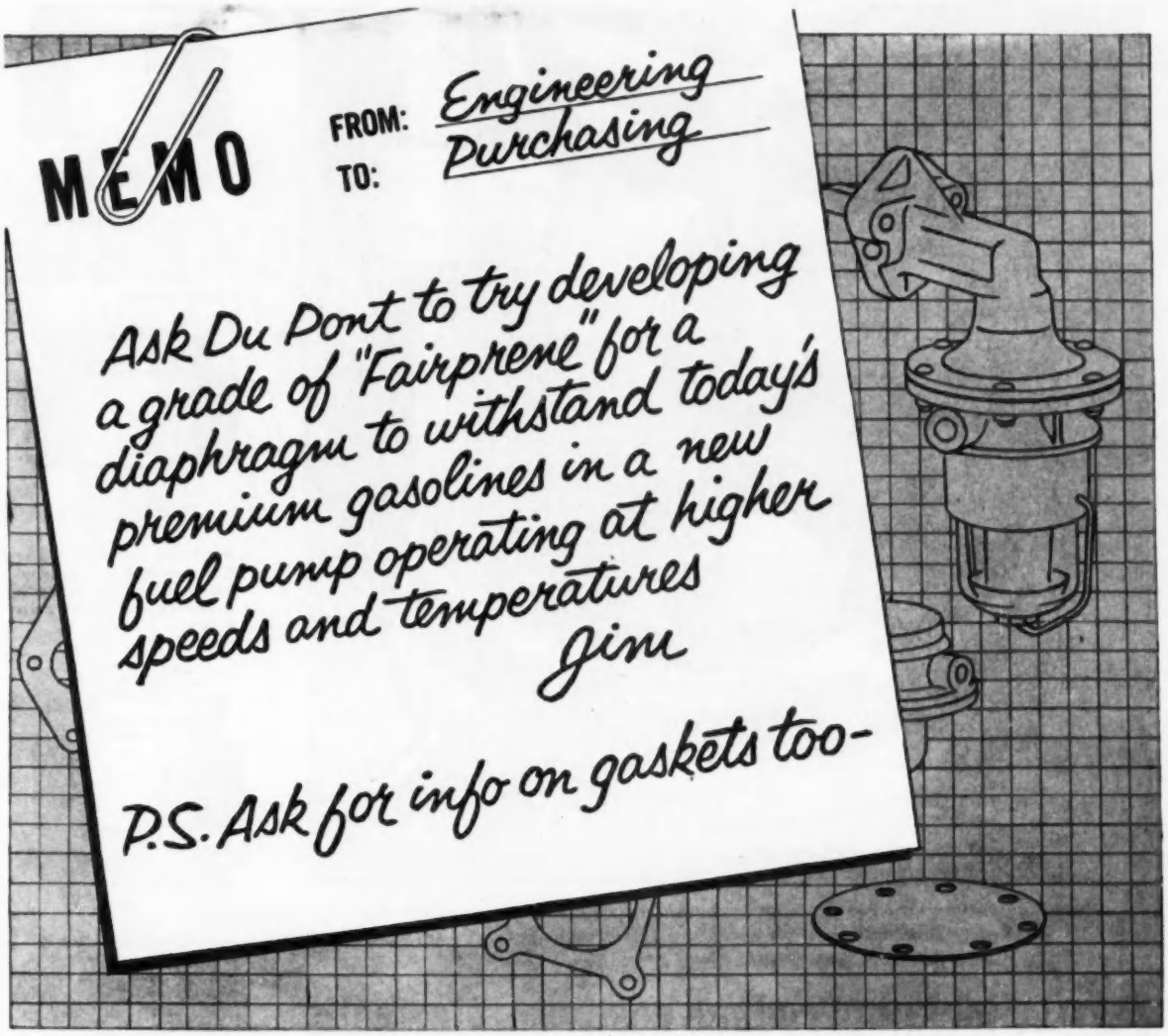


You can benefit from the American-Way when you want high production at low unit cost. Send a part print or sample for the recommendations of the company that engineers and builds all three — broaching machines, broaches and broaching fixtures. Write today. There is no obligation.

AMERICAN *American* BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

SUNDSTRAND

**See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery**




"CAN DO" will be the answer. Du Pont technicians are *always* ready to work with you to determine the specific requirements of an application. Then they "tailor" the properties of Du Pont "Fairprene"* synthetic elastic compositions to do just that job . . . and do it *right*.

The general properties of Du Pont "Fairprene" include toughness, flexibility and resistance to flex fatigue and abrasion, as well as resistance to aging from exposure to air, gasoline, kerosene and oil or grease—even at extreme temperatures. "Fairprene" comes in sheet stock, coated fabrics and adhesives. Among the many automotive uses for "Fairprene" compositions are weather-stripping cements, bearing seals, gasketing and diaphragms.

For more information—or to ask Du Pont's technical staff to work with you in developing special grades of "Fairprene" to meet your requirements—fill in and mail the coupon today.

# DU PONT FAIRPRENE®

*synthetic elastic compositions*

**"ENGINEERED TO DO YOUR JOB BETTER"**

DU PONT

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**BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY**

**"FAIRPRENE" is Du Pont's registered trade-mark for its line of products made from synthetic elastomers available in the form of coated fabrics, sheet stocks without fabric insert and adhesives.*

E. I. du Pont de Nemours & Co. (Inc.)
Fabrics Division, A. I., Fairfield, Conn.

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☐ Please send me further information on "Fairprene" synthetic elastic compositions.

The application(s) I am interested in for "Fairprene" compositions include:_____.

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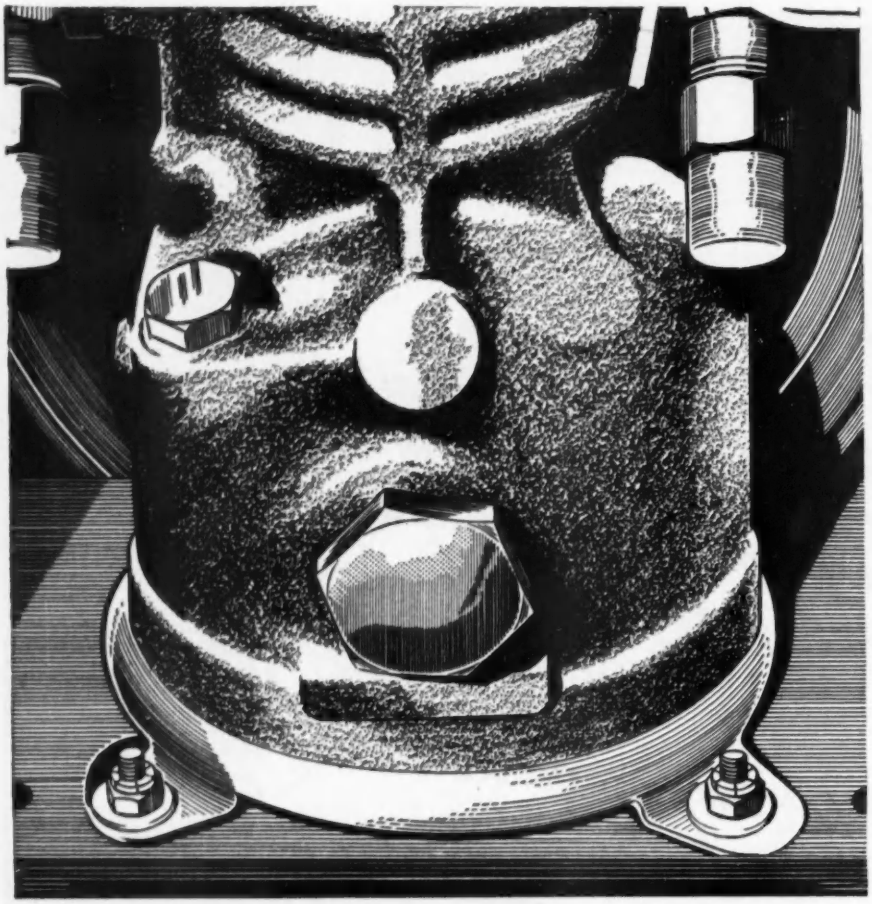
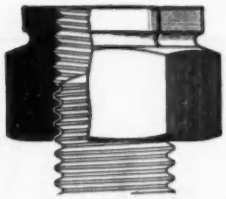


**Many manufacturers use FLEXLOCS** to fasten motors, compressors and other vibrating equipment to mounting plates. FLEXLOCS won't work loose . . . they eliminate costly service calls.

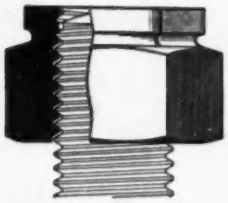
# FLEXLOC locknuts reduce costly service calls

FLEXLOC locknuts do this because they stay put anywhere on a bolt as soon as their locking threads are fully engaged. Even the most severe vibration will not work them loose. FLEXLOCS offer many other advantages, too. *They are one piece.* They eliminate complicated, time-consuming methods of locking studs and bolts. They provide simpler, faster application and safer, more dependable locking than plain nuts and lockwashers, castellated nuts and cotter pins, nuts and jam nuts. They save buying, stocking and handling of extra parts. *They are all metal.* They have higher tensile strength than most other lock nuts. They permit you to stock only one nut for all temperatures to 550°F. *They are reusable.* They can be applied again and again without losing locking efficiency—a plus value in maintenance.

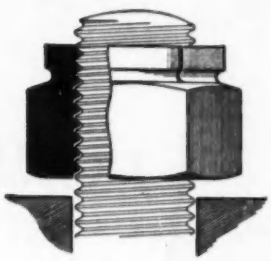
For information about FLEXLOCS and samples for test purposes, see your FLEXLOC distributor or write STANDARD PRESSED STEEL CO., Jenkintown 53, Pa.



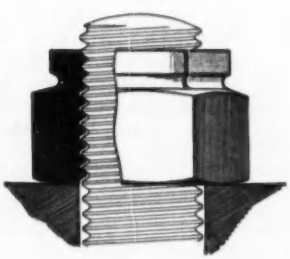
**Starting.** A FLEXLOC starts like any ordinary nut. Put it on with your fingers. Tighten it with a standard hand or speed wrench.



**Beginning to Lock.** As the bolt enters the segmented locking section, the section is expanded, and the nut starts to lock.



**Fully Locked As a Stop Nut.** When 1½ threads of a standard bolt are past the top of the nut, the FLEXLOC is fully locked. A FLEXLOC does not have to seat to lock.



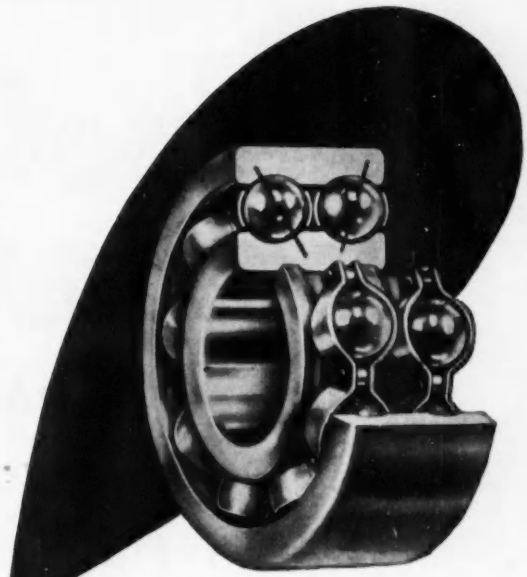
**Fully Locked As a Seated Nut.** When it is used as a lock or stop nut, the locking threads of the FLEXLOC press inward against the bolt, lifting the nut upward and causing the remaining threads to bear against the lower surface of the bolt threads. Vibration will not loosen a FLEXLOC, yet there is no galling of threads.

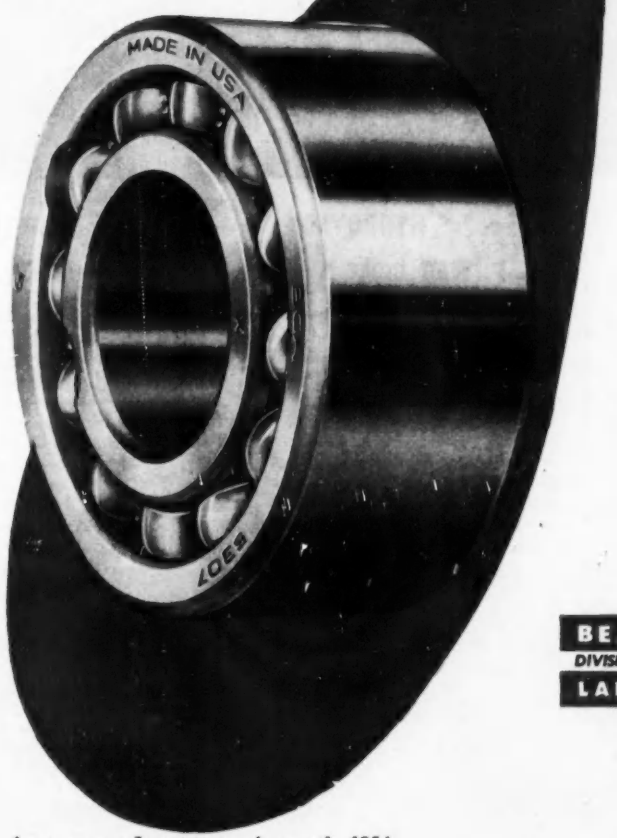
**FLEXLOC®** LOCKNUT DIVISION

**SPS**
JENKINTOWN PENNSYLVANIA

# BCA 5200 and 5300 SERIES BEARINGS

## can carry any combination of radial and thrust loads






These BCA double row bearings are of the Angular Contact, Maximum Capacity Type. The maximum load-carrying capacity is the result of the larger ball size in BCA design.

The vertex of the contact angle, between the balls and the raceways, falls within the bearing. This construction insures enough flexibility to compensate for mounting inaccuracies without sacrificing the rigidity required in many double row bearing applications.

BCA 5200 and 5300 Series Bearings can be furnished with shields and lock ring groove. Before specifying these added features, consult the BCA Engineering Department.

Complete data on these bearings is included among the valuable information in the BCA Engineering Handbook, which is available to chief engineers without charge. Write on your official staticnery.

**BEARINGS COMPANY OF AMERICA**
*DIVISION OF FEDERAL-MOGUL CORP.*
**LANCASTER • PENNSYLVANIA**

RADIAL, THRUST, ANGULAR-CONTACT BALL BEARINGS

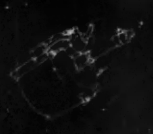
BCA

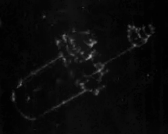
# Bendix power

## STEERING AND BRAKING

*sets new standards of driving ease and safety*

## Today's most wanted power features for cars and trucks





### Bendix * low pedal POWER brake

Specified by more car manufacturers than any other make, Bendix Low Pedal Power Brake makes possible quick, sure stops by merely pivoting the foot from stop-and-go controls. No need to lift the foot and exert leg power to bring the car to a stop. Result—more driving comfort, less fatigue and greater safety!

### Bendix * POWER steering

Because Bendix Power Steering is of the linkage type, vehicle manufacturers find it especially adaptable for production line installation, without extensive engineering changes. Manufacturers can now meet the increasing demand for power steering more efficiently and more economically with Bendix Power Steering.

### Bendix HYDROVAC* POWER brake

With over four million in use, the Bendix Hydrovac is by all odds the world's most widely used power brake for commercial vehicles. This overwhelming preference for Hydrovac is a result of sound engineering design, exceptional performance, low original cost and minimum service upkeep.

### Bendix * AIR-PAK POWER brake

With one simple compact unit, Bendix Air-Pak combines all of the well-proven advantages of hydraulic brake actuation with an air brake system. An important advantage of Air-Pak is that brakes can be applied by foot power alone when braking is required before air pressure builds up or if it should fail for any reason.

*REG. U.S. PAT. OFF.

Prospects are easier to sell and owners are better satisfied with cars equipped with Bendix power steering and braking.

For example, the Bendix Low Pedal Power Brake is by all odds the most popular and best proven power brake offered by any passenger car manufacturer today, and vehicle manufacturers can quickly and economically adapt the popular Bendix Power Steering to their present design without extensive engineering changes.

For truck manufacturers and operators, Bendix Hydrovac and Air-Pak have long been overwhelming favorites in the field of power braking for commercial vehicles.

That's why if you build, buy or sell passenger cars or trucks, it will pay to make sure they are equipped with Bendix power braking and steering.

**Bendix Products Division**

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# High Spots of This Issue

## ★ Service Life of Pistons Predicted by Latest Tests

This is the last member of a trio of articles devoted to aluminum pistons and based on material presented at an Alcoa symposium. Discussed in the final installment of the series are the newest methods for testing pistons. See Page 48.

## ★ More Automotive Parts by Shell Molding

The ever-growing popularity of the shell molding technique is no more apparent than in the Indianapolis Works Foundry of International Harvester Co. Reminiscences of a plant preview of the operations are given by the author. Page 52.

## ★ Productivity Increased at Eaton Axle Div.

Combined operations constitute but one of the many advantages accruing from an extensive equipment replacement program at the Eaton Cleveland plant. The machines and their other benefits are detailed in this survey. Page 56.

## ★ Corrosion as a Major Cause of Engine Cylinder Wear

Beyond a shadow of a doubt, taxicab service is one of the toughest forms of duty to which an automobile can be subjected. Engine wear is a major problem for fleet operators, and the writer studies it for likely solutions. Page 60.

## ★ New Mercedes Dominates at French Grand Prix

Few have been the occasions in automobile racing history when one make of car has swept the field. Such was the case, however, at a recent classic in France. Engineering features of the Mercedes-Benz are analyzed here. Page 66.

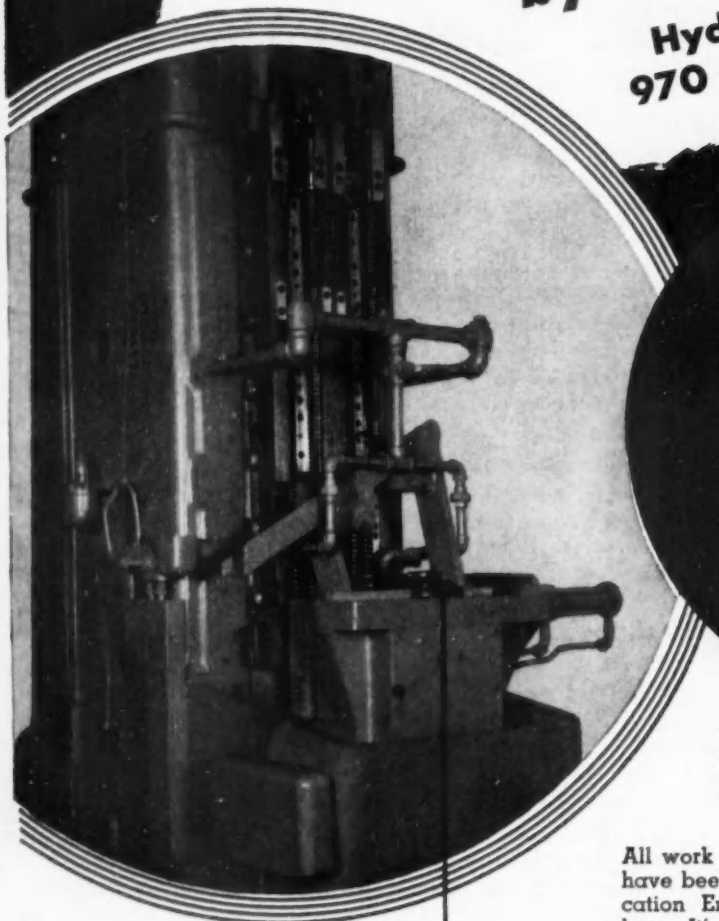
## ★ 30 New Product Items And Other High Spots, Such As:

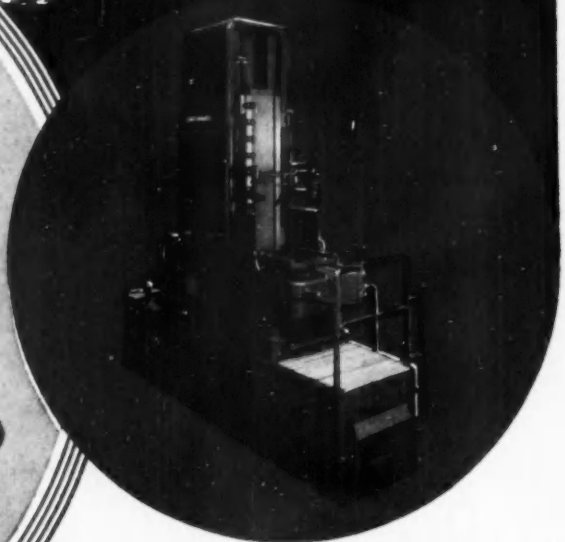
Unusual European vehicles; automatic controls for engines; electronic computer on wheels; newest Japanese vehicles; flywheel transmission; fender vibration; IHC cab; jet deviation system; manifold production; vacuum testing; large welded parts; and twin Hydra-Matic operation.

*Automotive and Aviation News, Page 33*
*Complete Table of Contents, Page 3*

# Complete Production Package by Cincinnati

## Hydro-Broaches 970 cams per Hour

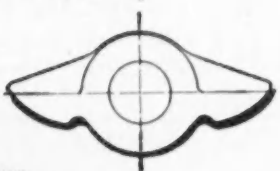




CINCINNATI Single Ram Vertical Hydro-Broach Machine. Seven sizes are available up to 10-ton broaching force, 66" stroke. Write for catalog No. M-1745. Data for larger sizes on request.

CINCINNATI No. 5-54 Single Ram Vertical Hydro-Broach, tooled up by Cincinnati Application Engineers to broach the cam profile and clearance on automotive cams.

Drawing of the cam broached on the equipment illustrated here. Color line indicates broached surface. Production 970 cams per hour.



All work and no play . . . for the machine . . . must have been the motto in mind when Cincinnati Application Engineers developed the equipment shown here. It's a complete production package, consisting of a CINCINNATI No. 5-54 Single Ram Vertical Hydro-Broach with all the necessary tooling. Operation is simplicity itself. ¶ The operator merely places four parts (two stacks of two) on the air operated fixture, and the production cycle is automatic. At the top of the stroke a pusher moves the work to the edge of the fixture, where the pieces drop into position on tapered pins and are pneumatically clamped when the ram descends. On the upward stroke, the finished parts are ejected into a chute. **The ram cycle proceeds continuously broaching 970 cams per hour.** This equipment may give you some ideas in raising production and reducing cost. It is typical of the work handled by Cincinnati Application Engineers. These men are willing to give you the benefit of their many years' experience in tooling up new Hydro-Broach machines. May we hear from you? Please give us complete engineering and production data.

**THE CINCINNATI MILLING MACHINE CO.**
**CINCINNATI 9, OHIO**

CINCINNATI

# CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 111, No. 3 August 1, 1954

### Chrysler Plants to Prepare For New Model Production

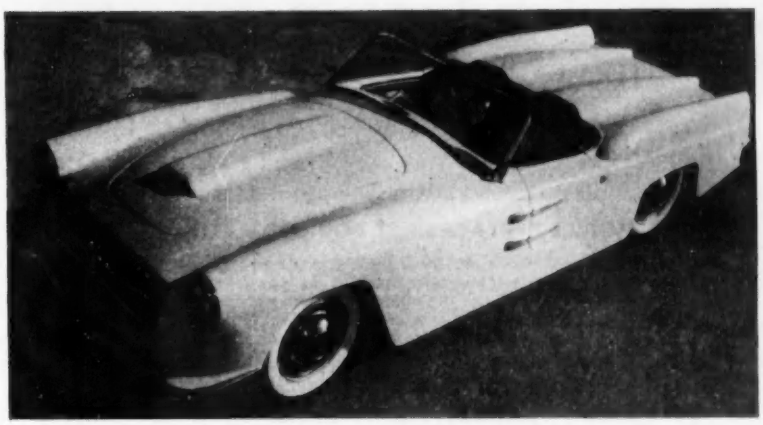
A shutdown of Chrysler plants this month for various lengths of time indicates the corporation is getting ready to start production on its 1955 models. Plymouth reportedly will be the first plant to go down for rearrangement of machines, conveyors and installation of new dies, jigs and fixtures in its principal body building and car assembly plants. Inventory periods at other Chrysler divisions will vary from plant to plant.

The halt in current car building operations will affect a total of approximately 38 per cent of the corporation's 107,000 employees at various times. Work will continue, however, in a number of plants on certain machining, maintenance, foundry, and forging operations on parts and subassemblies. Additional employees will be retained to handle the rearrangement of equipment within the plants, as well as the physical inventory count.

### Trustees Fight to Save K-F Pension Fund Plan

Results of a suit filed by more than 250 former Kaiser Motors Corp. workers asking for a split of the company's $6 million pension fund could be significant. If the former K-F workers win the suit, it would open the way for similar action against other companies which have made shifts in employment as a result of consolidation.

Latest developments, however, indicate that trustees of the K-F fund will fight the action, and a motion to dismiss a court order restraining the altering of the operation of the fund in any manner has been filed by the trustees. The court order halts pension payments to anyone not already receiving them.



**VENUS MOLDED IN PLASTIC**

*The Venus sports car body, molded in one piece of American Cyanamid polyester resin reinforced with glass fibers, is offered by Ratio Manufacturing Co. for mounting on a standard Ford chassis of 1949 through 1951 models. Although car shown is powered by a 1949 Ford engine, ample engine compartment space is available for GM, Chrysler, or Lincoln V-type engines, according to the company.*

More than 85 per cent of the K-F workers were displaced when the Willow Run plant was taken over by General Motors Corp., and a large percentage of the employees lost their accumulated pension credits. The fund's trustees have assured the workers that they can pay the established rate of benefit to all claimants 65 years old from the fund, which will meet all retirement benefits until 1965 without touching the principal.

### Federal to Halt Truck Output; Service Expected to Continue

According to latest reports, Federal Motor Truck Co., recently sold to Mast-Foos Mfg. Co. by Federal-Fawick Corp., will discontinue production of its regular truck line. Although it may build special vehicles from time to time, main field of activity will be service work.

### Output of Corvettes Cut to 300 Monthly

Chevrolet, which formerly had planned to increase its production schedule for the Corvette sports car to 1000 units a month, last month slashed output of the automobiles to a 300-a-month level. While the company did not give any reason for the sudden drop, general opinion is that there is a more limited market than originally anticipated.

The proposed boost to a 1000-a-month rate apparently was based on the heavy demand during June, when more than 900 units were turned out. It was the company's original production rate goal when the car was first introduced a little over a year ago. In May alone, the St. Louis plant, the only source for the plastic body car, produced 600 Corvettes. Company officials did not indicate what August production might be.

# News of the AUTOMOTIVE

**MOBILE REPLACEMENT FOR OLD ARMY MULE**

*Developed by Willys Motors and the Detroit Arsenal, the Army's new mobile carrier for arms and supplies is now undergoing tests at the Aberdeen, Md., Proving Ground. Dubbed the "Mechanical Mule", it weighs only 750 lb and can transport loads up to ½-ton. Powered by a four-cyl engine at speeds up to 25 mph, it is 100 in. long, 46 in. wide, and has a chassis only 27 in. high.*

### Ford Plans to Expand Two Stamping Plants

Ford has announced that it will expand its stamping plants in Cleveland and Buffalo. Manufacturing space at the new Cleveland plant will be increased to more than one million sq ft with the addition of a 300,000 sq ft building. At the Buffalo plant, a 160 by 500 ft unit to be added to the present plant will be devoted mostly to tool and die facilities.

The company also plans to add six more press lines at the Cleveland plant, where production is expected to get under way the latter part of this year. When completed, the Cleveland plant will equal the Buffalo unit in size and productive capacity.

### Sale of Reo Motors Wins Approval of Stockholders

Sale of Reo Motors, Inc., of Lansing, Mich., to Henney Motor Co. of Freeport, Ill., marks the second such transaction involving a major truck producer in little over a year. Last year, the Autocar Co., which had been in the truck business more than 50 years, was acquired by White Motor Co. to bring the latter a broader model line.

Sale price of Reo was disclosed as $16.5 million by C. Russell Feldmann, president of Henney, who made the offer for the corporation about two months ago. It hinged on stockholder approval and a favorable tax ruling, which Reo officials said had been received.

The corporation, which has a plant in Leaside, Ont., in addition to the Lansing facility, will be known as Reo Holding Corp. Under the transaction, Henney will assume Reo's liabilities, which totalled more than $18 million as of Dec. 31

### Chrysler Vehicle Exports Up 21 Per Cent Over 1953

While U. S. sales of Chrysler vehicles are down under last year, exports of both cars and trucks by the corporation continue upward. During the first five months, vehicle sales abroad increased 21.3 per cent over the comparable period last year.

Car exports of the corporation were up 15.8 per cent, while the number of trucks climbed by 30.8 per cent over the same period of 1953. One of Chrysler's regions—comprising Australia, Africa, India and Pakistan—represented an increase of 50.6 per cent over 1953.

### Two-Level Intercity Bus Has Twin Diesel Engines

The first of a fleet of 500 new type Scenicruiser buses for the Greyhound Lines were delivered last month by GMC Truck and Coach Div. This 43-passenger bus incorporates a number of engineering advances that will permit more efficient operation and maintenance.

One of the innovations in the Scenicruiser design is the rear passenger deck, which is elevated above the forward seating area. Other improvements are individually controlled reclining seats, added leg room, and the inclusion of washroom facilities.

In the interior, three steps lead from the 10-passenger forward deck to the 33-passenger rear level. The upper level is covered by broad rooflights of special safety glass.

#### Engineering Features

Most important mechanical innovation is the use of two four-cyl GM Diesel engines. These 150-hp units mount side-by-side in the rear of the bus. They drive the coach through two fluid couplings connected with a multiple-speed transmission, and also operate the generator and air compressors.

A power take-off from the right engine operates the air-conditioning system. Should either engine fail, manual operation of the fluid coupling by the driver will permit the other engine to propel the bus and run the accessories. The fluid coupling also permits one engine to operate the air-conditioning unit at idling speed when the bus is parked at terminals. These twin engines are mounted as a unit, so they can be removed and replaced by another dual-engine assembly.

Air suspension is standard equipment. The bus floats on cushions of compressed air contained in 12 flexible rubber-nylon bellows, two over each wheel. Automatic valves control pressure.

The differential is on the forward of the tandem rear axles, for driving power, while the rear axle rides free. All four rear wheels carry dual tires. The Scenicruiser is said to be less than a foot higher than other buses.

# AND AVIATION INDUSTRIES

### *Erection of Huge Smelter In Canada Is Launched*

Aluminum Co. of Canada is starting production this summer at the first $250 million stage of its new Kitimat smelter plant in British Columbia. When completed this smelter will be the largest of its kind in the world with a yearly output of 550,000 tons of aluminum. The hydroelectric powerhouse, operated by the waters from a chain of lakes 10 miles away and flowing through a 25-ft diam tunnel in the mountains, will produce 2240 million hp. By the end of this year, production is expected to reach an annual rate of 91,500 tons.

### *Willys Export Sales Hit Six-Month Peak*

Vehicle export sales of Willys-Overland during the first six months of this year reached an all-time high of 22,954 units, nearly 20 per cent over the like 1953 period and 8 per cent above the previous high established in 1952. The company reported that the June total marked the fourth straight month export sales had risen above 4000 units.

Willys-Overland Export Corp. predicted that total sales for the year would top $50 million. The increase was attributed to a new merchandising and advertising campaign, which includes tours by Jeep cavalcades in 25 countries.

### *White Expects First-Half Sales to Equal Last Year*

Robert F. Black, president of White Motor Co., expects sales and profits of the company for the first six months to compare favorably with those for the same period a year ago. White's sales in the six months last year amounted to $77.194 million and profits, $1.965 million. During the first quarter of this year, earnings amounted to $1.35 a common share, compared with $1.26 in the 1953 quarter.

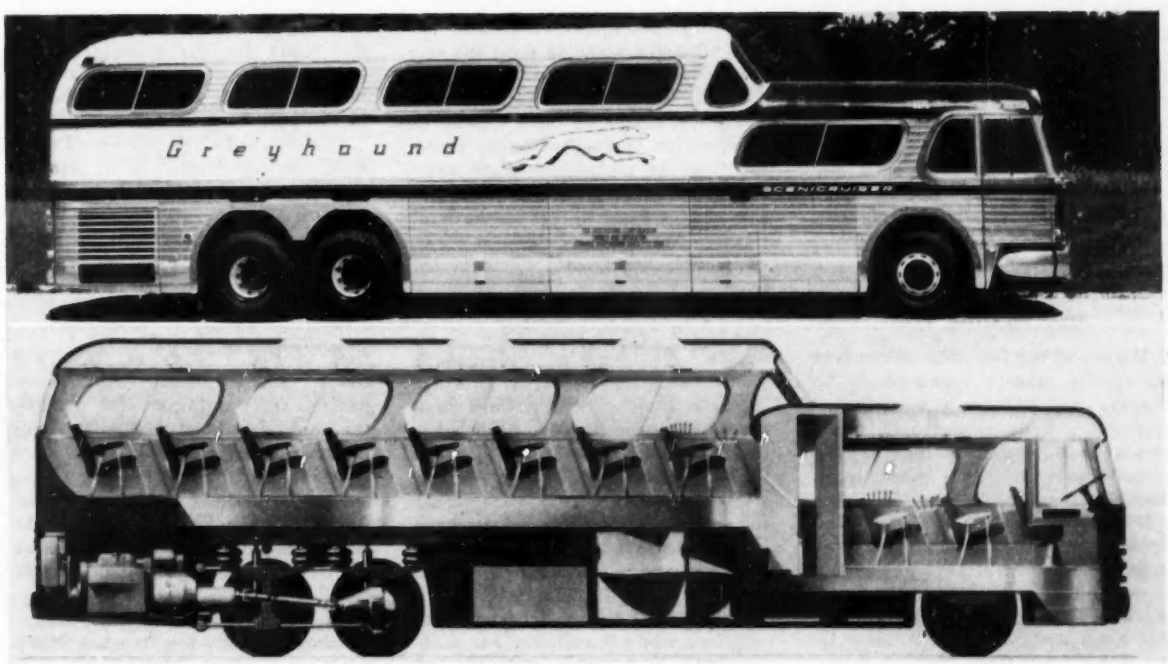
### *Chrysler Corp. Opens New Defense Office*

As part of its program to decentralize its organization, Chrysler Corp. has created a Defense Dept. which will handle most of the future procurements for the corporation. Except for the guided missile project, the department will be responsible for obtaining defense business for the company's tank and tank engine operations and work in the Navy jet engine plant near Detroit.

Heading up the new department will be Thomas F. Morrow. Prior to his appointment, Mr. Morrow served as Chrysler's works manager at the Detroit Tank Plant.

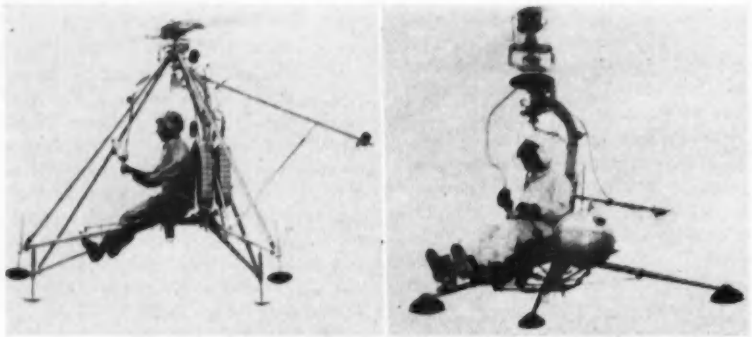
### *U. S. to Free More Nickel For Civilian Use This Year*

A review of the nickel requirements by the Government indicates that it will need less of the metal this year than in 1953. The Business and Defense Service Administration estimates there will be approximately 10 per cent more nickel available.




*The sleek Scenicruiser is shown standing ready for the road (top), while cutaway profile shows it as a new concept in bus design.*

# News of the AUTOMOTIVE



**ONE-MAN WHIRLYBIRDS TAKE TO THE AIR**

*Two tiny helicopters unveiled by the Navy recently make use of innovations designed to improve the propulsion systems and control of rotary-wing aircraft of the future. The single-passenger, rocket-powered RH-1 (left) was developed by Rotor-Craft Corp. Its propulsion system has small rocket engines at the tips of the helicopter blades. Second of the new whirlybirds is the KH-15; built by Kellett Aircraft Corp. Also powered by rocket engines, it has gyro-stabilizing controls to make it more stable in flight and to reduce vibration. Rocket engines for the two craft were built by Reaction Motors, Inc., and have undergone a number of tests.*

## Studebaker, Packard Integration Begins to Take Form

Further information about the consolidation of Packard Motor Car Co. and Studebaker Corp. into a new company, to be known as Studebaker-Packard Corp., points up some of the ambitious plans that will be undertaken when the two firms combine. For one, since new emphasis is being placed on diversification of products by manufacturers, both companies feel they would be in a better position by inviting some other non-automotive business into the new combination. Speculation that the new company might take on an appliance line has been unsupported, however.

### Approval Being Lent

Merger of the last two independent automobile makers appeared to be shaping up without any concerted opposition. First approved by directors of both companies June 22, the consolidation will be voted upon Aug. 17.

Dissenting stockholders in the Studebaker-Packard merger, it was indicated, would not have any rights to demand an appraisal of the value of their shares, as was the case in the Nash-Hudson consolidation. In the latter case, some Hudson shareholders objected that the value placed on shares following the exchange was not "fair cash value."

### Ideas for the Future

Both Packard and Studebaker envision benefits accruing from the consolidation. It is conceivable that Packard, which makes its own automatic transmissions, could expand its facilities to cover Studebaker transmissions. In turn, Studebaker would enlarge its Los Angeles plant for assembly of Packard cars on the West Coast. At present, Packard ships completed cars from Detroit to the coast.

Combined volume of the two lines also might justify installation of assembly facilities in Studebaker's plant in New Brunswick, N. J., which has been used for defense work since it was completed in 1951. Studebaker also has another assembly plant in Hamilton, Ont.

There are also other manufacturing and operating facilities of Packard and Studebaker which complement each other to a considerable degree. Packard makes several items which Studebaker has been purchasing from suppliers, while Studebaker has modern facilities for the production of certain automobile components which Packard has been buying elsewhere.

### Cost Element Important

Packard, which last month started building its own bodies in the Conner plant leased from Chrysler with an option to buy, will transfer its final car assembly lines from its main plant in Detroit to the new facility before the end of the year. As far as 1955 models are concerned, major Packard automobile manufacturing will be housed in two completely modern facilities—final assembly at Conner, and engine and chassis parts at its new plant in Utica, Mich. The old main plant will be used for office space and machine operations.

It is believed that the per unit cost of both lines could be reduced by savings in tooling costs on new design, integration of engineering, and administrative staffs. Studebaker and the union are now engaged in negotiations which, when consummated, are expected to result in substantial reductions in manufacturing costs.

## Vehicle Orders to be Granted By Army Total $266 Million

Bid proposals are being sought by the Army for the manufacture of $266 million worth of combat and tactical vehicles. These will be bought in the year beginning June, 1955.

Vehicles to be ordered are: Patton B-48 medium tanks; M-59 armored infantry carriers; M-42 twin 40-mm self-propelled gun carriers, and five-ton cargo trucks. Each of the types named is being produced by a single supplier under contracts running through next May.

Turning out the M-48 tank at this time is Fisher Body at its Grand Blanc, Mich., plant. Other companies with equipment for making the tank are Ford Motor Co. and Chrysler Corp.

Food Machinery Corp., Calif., builds the armored infantry vehicle, while Cadillac produces the light tank chassis for twin 40-mm guns at the Government-owned tank plant in Cleveland.

International Harvester Co. manufactures the five-ton truck. Mack truck and Diamond T also are equipped to build the truck.

# AND AVIATION INDUSTRIES

## CROSS IN NEW CAPITAL POST

*Secretary of Commerce Sinclair Weeks swears in Ralph Cross, executive vice-president of the Cross Co., as assistant administrator of the Business and Defense Services Administration, U. S. Dept. of Commerce. Mr. Cross came to BDSA last February as director of the agency's Metalworking Equipment Div. In his new post, he will have primary responsibility for 10 divisions, including those dealing with automotive and metalworking equipment, power machinery, electronics, ordnance, and aircraft.*

### Ferguson Resigns Post at Massey-Harris, Ltd.

Harry Ferguson has resigned as chairman and director of Massey-Harris-Ferguson, Ltd., to develop inventions outside the agriculture field upon which he has been working many years. James S. Duncan will become chairman of the company and retain his title of president.

Mr. Ferguson also reportedly has sold his interests in the company. Massey-Harris acquired control of the Ferguson companies in a merger last October, paying for the Ferguson assets by issuing 1,805,055 shares of stock.

### Walter, Stone Elected to Posts In Drop Forging Association

K. E. Walter, president of Alliance Drop Forging Co., was elected president of the Drop Forging Association at its recent annual meeting. Charles W. Stone, vice-president of Interstate Drop Forge Co., was elected vice-president of the organization.

## AI TABLOID

**Rem-Cru Titanium, Inc., now has available a high-strength, titanium-base alloy sheet. . . . Shawinigan Water and Power Co. of Canada reports the development of a new electrolytic process for making high-grade titanium at low cost. . . . Armour Research Foundation announces development of a light-weight titanium alloy with reported tensile strengths of up to 192,000 psi.**

* * *

**Continental Motors Corp. has signed an agreement with Fuji Motors Corp. to manufacture its E185 aircraft engines in Japan.**

* * *

**General Electric Co. has disclosed development of an X-ray microscope that is said to magnify up to 1500 diameters.**

* * *

**Commercial production of Plexiglas extruded sheet has been announced by Rohm & Haas Co.**

* * *

**Glar-Ban Corp. is the name of a new firm founded in Buffalo, N. Y., to manufacture and market a new "non-glare" lighting system for automobile headlights and instrument panels on both cars and aircraft.**

* * *

**Solventol Chemical Products, Inc., has licensed Electro Chemical Engineering Co., Ltd., to manufacture its Di-Phase cleaners and cleaning equipment. . . . Resistoflex Corp. has completed a licensing agreement with Superflexit, Ltd., to manufacture and distribute its Fluoroflex-T hose and hose assemblies.**

* * *

**Pratt & Whitney has developed a nickel-based, heat-resisting alloy for jet engine turbine blades. The new alloy has been dubbed "Waspaloy."**

**Republic Steel Corp. has established a new division to coordinate sales of high-strength steels. . . . Cook Electric Co. has organized Plymold Div. to produce laminate fiberglas plastics.**

* * *

**Penn-Texas Corp. has acquired the properties and business of Industrial Brownhoist Co. . . . Blue Crown Spark Plug Corp. has been purchased by Zeller Corp.**

* * *

**General Motors Corp. has been named "best managed company in the transportation equipment industry" by the American Institute of Management.**

* * *

**Westinghouse Electric Corp. will build a new multi-million-dollar sound laboratory and test center for transformers at Sharon, Pa.... Two new plants will be erected at Delaware, Ohio, and Chicago Heights, Ill., for its Chemical Specialties Div. by Pennsylvania Salt Mfg. Co.**

* * *

**Aluminum Co. of Canada has established a new branch office in Detroit.**

* * *

**General Electric Co. has formed new Meter and Instrument Depts. . . . Townsend Co. has established a new Technical Sales Dept.**

* * *

**Willys Motors, Inc., through its new Industrial Engine Dept., is now actively promoting for industrial use its four-cyl Model 4F engine. It also is offering for industrial applications a four-cyl "L" head engine, six-cyl "F" head unit, and six-cyl "L" head power plant.**

* * *

**Libbey-Owens-Ford Glass Co. is offering an industrial film on the manufacture of fiberglas reinforced plastics.**

# News of the AUTOMOTIVE


**EXPANDING VAN TAKES TO ROAD**

*Novel traveling auditorium, built by Boyertown Auto Body Works, is ready for its audience of 100 persons. Unit consists of two giant tractor-trailers which are joined side-by-side to form a meeting room containing 1000 sq ft of floor space. Six men can swing the self-propelled units into position, expand the trailer bodies, and set up the "theatre on wheels" in less than 45 minutes. Double sides open up to form an expanded ceiling and floor area, and jacks stabilize the floor where the vans are joined. A crank is used to extend the front, rear, and outside walls. Double doors and a set of portable steps are located in the rear for entrance and exit.*

### Chrysler, Mercury Report Record Sales in Period

Car sales, which normally ease down after the mid-year peak, continued upward from the four-year high during June. Among the car makers reporting record sales for the first 10 days of July were Chrysler Div. and Mercury.

Chrysler dealers reported delivery of 3086 cars between July 1 and 10 to top all previous 10-day sales periods this year, and sales by the division for the last six months of 1954 are expected to exceed earlier predictions. The division based much of its optimism on the steady increase in sales since the beginning of June.

Mercury also reported that sales during the first 10 days of July were the highest of any comparable period since May, 1950, in totaling 10,312 units. There were 1352 Lincolns sold in the same period, higher than any first 10-day period since June, 1953.

### Factory Delivery Plan Expanded by Chevrolet

Chevrolet has joined the list of car manufacturers which are promoting factory delivery programs and, after a 13-year lapse, is making cars available to buyers in all areas. Under its previous program, only buyers from distant areas could pick up their cars directly at the factory.

As of July 1, the company delivered about 2400 cars to customers in Flint alone, where the factory delivery office is located. It has already registered names of customers from such points as Japan and Alaska.

Chevrolet's program operates principally the same as that of other car makers. Customers place their orders with a dealer in their town, who makes arrangements for picking up the car at the factory.

### GE Plans to Construct New Heating Facility

General Electric Co. has announced that it will begin construction this year of a new $5 million plant at Shelbyville, Ind.

It will be used for the manufacture of industrial furnaces, induction heating equipment, and heating devices.

When completed in 1955, the new plant will accommodate manufacturing operations now located at Schenectady and Pittsfield, Mass. It will be located on a 50-acre site, and employment eventually will total about 800 persons.

### Ford, Simca Merger Makes Combine Second in France

Ford of France and the Simca Co. were combined last month under an agreement reached by the boards of directors. Ford stockholders will receive in exchange for their 10,481,000 shares of a nominal value of 100 francs, 455,715 new Simca shares of a nominal value of 5000 francs each, or the equivalent of one Simca share for 23 Ford shares.

The Ford plant at Poissy, to the west of Paris, will come under Simca control. The facility covers an area of 2.691 million sq ft and has 2800 modern machine tools. Main production line is the eight-cyl Vedette, while the Comet is in smaller production. Bodies for these are produced by Chausson. In addition to passenger cars, Ford has a line of trucks equipped with the Hercules Diesel engine built by Hispano-Suiza.

The Simca factory is one of the most modern in France. One passenger car model is produced, and the same components are used for light trucks. Simca turned out 38,412 vehicles during the first five months of 1954.

In addition to the passenger car works, Simca has absorbed Unic, one of the oldest of French firms, now on heavy truck production only. Output for the first five months of this year was 840, compared with only 360 for the corresponding period of 1953.

Another branch of Simca, called Someca, produces agricultural tractors with the Italian O.M. (Fiat controlled) Diesel engine, all the shock absorbers for Simca, a certain number of special military vehicles, and rockets.

The combination makes Simca-Ford become the second biggest producer in France, behind Renault and ahead of Citroen and Peugeot. Passenger car manufacturers in France are thus now practically reduced to five—Renault, Simca-Ford, Citroen, Peugeot and Panhard. A few others are in such small production that they hardly count.

It is believed that present Ford models which do not come in competition with those of Simca will be continued. Changes are likely to be made next year, however.

## CHEVROLET HOLDS TOP SPOT BUT FORD PERCENTAGE UP

### 1954 New Passenger Car Registrations*

*Arranged by Makes in Descending Order According to the 1954 Five Months' Totals*

| MAKE | May 1954 | April 1954 | May 1953 | FIVE MONTHS Units 1954 | Units 1953 | Per Cent of Total 1954 | Per Cent of Total 1953 |
|---|---|---|---|---|---|---|---|
| Chevrolet | 132,966 | 126,255 | 129,764 | 548,824 | 532,692 | 24.69 | 22.79 |
| Ford | 127,523 | 121,475 | 90,112 | 537,807 | 403,006 | 24.22 | 17.24 |
| Buick | 51,534 | 50,359 | 43,549 | 206,836 | 169,216 | 9.32 | 6.09 |
| Plymouth | 38,184 | 37,926 | 84,207 | 173,652 | 244,132 | 7.82 | 10.44 |
| Oldsmobile | 42,626 | 38,643 | 31,690 | 150,691 | 133,230 | 6.80 | 5.70 |
| Pontiac | 32,872 | 32,560 | 38,314 | 147,505 | 161,021 | 6.64 | 6.89 |
| Mercury | 24,794 | 25,603 | 21,317 | 124,484 | 101,700 | 5.61 | 4.35 |
| Dodge | 13,886 | 14,148 | 30,249 | 64,266 | 128,732 | 2.89 | 5.51 |
| Chrysler | 9,288 | 9,794 | 14,771 | 46,765 | 66,248 | 2.11 | 2.83 |
| Cadillac | 10,735 | 11,169 | 9,726 | 42,077 | 46,137 | 1.90 | 1.97 |
| Studebaker | 7,582 | 8,968 | 19,318 | 39,798 | 66,972 | 1.79 | 2.86 |
| Nash | 7,929 | 8,282 | 15,076 | 34,937 | 72,509 | 1.57 | 3.10 |
| De Soto | 6,490 | 7,398 | 11,620 | 33,937 | 50,878 | 1.53 | 2.18 |
| Packard | 3,065 | 3,741 | 7,725 | 19,572 | 36,829 | .88 | 1.58 |
| Lincoln | 3,460 | 3,589 | 4,599 | 15,993 | 16,553 | .72 | .71 |
| Hudson | 2,729 | 2,779 | 7,541 | 13,373 | 31,206 | .60 | 1.33 |
| Willys | 1,814 | 1,670 | 4,521 | 7,786 | 23,413 | .35 | 1.00 |
| Kaiser | 988 | 1,153 | 2,559 | 3,903 | 12,781 | .18 | .55 |
| Henry J | 87 | 123 | 1,000 | 624 | 5,927 | .03 | .25 |
| Misc. Domestic | 240 | 399 | 272 | 945 | 1,281 | .04 | .05 |
| Foreign | 2,166 | 2,068 | 2,648 | 9,166 | 13,530 | .41 | .58 |
| Total—All Makes | 520,958 | 508,102 | 540,575 | 2,220,081 | 2,338,000 | 100.00 | 100.00 |

*Based on data from R. L. Polk & Co.

## *Detroit Arsenal Unveils Engineering Facilities*

Official opening last month of the engineering laboratories of the Detroit Arsenal marked completion of a major part of the $20 million program started in 1944. The engineering and laboratory building is made up of four wings containing a total of 365,000 sq ft of floor space.

### Wide Range of Equipment

Included is an auditorium which can accommodate 350 persons and which is equipped with a rotating platform for displaying vehicles up to 60 tons in size; a unit containing laboratories for photographic, electrical, materials and mechanical work; a section which houses the Experimental Div., a model shop, and another mechanical laboratory, and a cafeteria.

First phase of the program, which will keep alive research and engineering in low periods of military effort, was completed in April, 1947, and includes the X-ray laboratory. Temporary engine test facilities were set up a year later in a building, which at one time had been a tank repair garage, and by 1950 the low temperature laboratory was completed.

### Testing Setups

Under construction at present is a building which will house the dynamometer laboratory and eight high temperature test cells. Six of these will be used for testing engines and two for transmissions.

The cells will be capable of testing a complete combat vehicle or mock-up over its entire operating range, and under controlled temperature conditions up to 150 F. A vehicle can be subjected to wind directions from eight points with velocities up to 20 mph. This unit is expected to be placed into operation about January, 1956.

Inspection of heavy metal sections, ranging from three to 20-in. thickness, is now accomplished with a special compact high speed radiographic unit called the 15 MEV Industrial Betatron. Constructed for the arsenal by General Electric, the unit can examine extremely thick sections with a maximum degree of radiographic sensitivity (approximately one per cent) and thickness latitude.

### Future Facilities

Eight other projects also are included in the arsenal's multi-million program, but funds for these have not yet been appropriated. Planned are: a gage engineering building; a one-mile, high-speed test track; a group of test slopes; consolidated services shop; fuel storage area; new administration building; physics laboratory; and an extension to one of the present wings for fabrication

Continued on Page 98

## STUDEBAKER EDGES INTO SIXTH TRUCK POSITION

### 1954 New Truck Registrations*

*Arranged by Makes in Descending Order According to the 1954 Five Months' Totals*

| MAKE | May 1954 | April 1954 | May 1953 | FIVE MONTHS Units 1954 | Units 1953 | Per Cent of Total 1954 | Per Cent of Total 1953 |
|---|---|---|---|---|---|---|---|
| Chevrolet | 27,671 | 26,548 | 31,237 | 120,924 | 144,621 | 34.79 | 36.35 |
| Ford | 25,900 | 24,375 | 23,406 | 113,377 | 96,336 | 32.61 | 24.19 |
| International | 7,740 | 7,694 | 9,389 | 34,658 | 44,584 | 9.97 | 11.19 |
| G. M. C. | 6,221 | 6,654 | 7,767 | 29,942 | 37,549 | 8.61 | 9.43 |
| Dodge | 5,500 | 5,269 | 7,338 | 26,050 | 39,969 | 7.49 | 10.04 |
| Studebaker | 1,034 | 1,068 | 2,320 | 4,657 | 11,572 | 1.34 | 2.91 |
| White | 892 | 1,088 | 1,191 | 4,622 | 5,246 | 1.33 | 1.32 |
| Willys Jeep | 634 | 611 | 832 | 3,024 | 3,945 | .87 | .99 |
| Willys Truck | 665 | 534 | 762 | 2,529 | 4,351 | .73 | 1.09 |
| Mack | 595 | 560 | 572 | 2,434 | 2,823 | .70 | .71 |
| Diamond T | 261 | 241 | 362 | 1,181 | 1,442 | .34 | .36 |
| Reo | 186 | 191 | 328 | 1,010 | 1,616 | .29 | .41 |
| Autocar | 109 | 114 | 183 | 520 | 734 | .15 | .18 |
| Misc. Domestic | 582 | 515 | 636 | 2,657 | 3,186 | .76 | .80 |
| Misc. Foreign | 10 | 22 | 19 | 79 | 121 | .02 | .03 |
| Total—All Makes | 78,209 | 75,504 | 86,386 | 347,661 | 396,295 | 100.00 | 100.00 |

* Based on data from R. L. Polk & Co.

# Men in the News

*Packard Motor Car Co.—Dan O'Madigan, Jr., has been named sales manager.*

Westinghouse Electric Corp.—**Raymond F. Gomber** has been appointed industrial products advertising and sales promotion manager.

Hyatt Bearings Div., General Motors Corp.—**Carl W. Kalchthaler** has been appointed chief engineer. He succeeds **H. Ralston Gibbons**, who has been named technical assistant to the general manager.

Pratt & Whitney Div., Niles-Bement Pond Co.—**Raymond S. Fox** was named chief engineering consultant of the Gage Div., and **Charles A. Whitney** was made chief engineer of the Gage Engineering Dept.

R. M. Hollingshead Corp.—**Anthony C. Kupris** has been appointed general advertising manager.

Fruehauf Trailer Co.—**Douglas S. Brown** has been named assistant controller.

Dunlop Tire & Rubber Corp.—**Robert J. Patrick** has been named manager of truck tire sales and **C. S. McChesney** is now chief engineer of the Buffalo, N. Y., plant.

National Carbon Co.—**Arthur C. Bryan** has been appointed vice-president and general manager of consumer products and **William H. Feathers**, vice-president and general manager of industrial products. **Walter A. Steiner** has been named vice-president in charge of development.

Chrysler Corp.—**Joseph M. Dodge** has returned to the board of directors.

Pontiac Motor Div., General Motors Corp.—**Mark J. Garlick** has been appointed assistant chief engineer, succeeding **R. R. Hutchison**, retired.

Warner & Swasey Co.—**Donald M. Pattison** has retired as vice-president in charge of sales.

Ford Motor Co.—**Ben R. Donaldson** has been appointed director of institutional advertising.

*Motor Wheel Corp.—J. Harold Hunt has retired as vice-president in charge of automotive engineering but will remain a member of the board of directors. Succeeding him is Albert P. Schweizer, former executive engineer.*

U. S. Rubber Co., Footwear & General Products Div.—**Eugene A. Luxenberger** has been elected vice-president and general manager. **Gregg R. Ward** succeeds him as assistant general manager.

Detroit Diesel Engine Div., General Motors Corp.—**F. Glen Shoemaker** has retired as executive engineer.

Lincoln-Mercury Div., Ford Motor Co.—**T. Jack Henry** was promoted to manager of advertising, sales promotion and training, succeeding **Robert F. G. Copeland**, now director of product advertising and sales promotion.

*Chrysler Div., Chrysler Corp. — Maurice J. Harris has been appointed assistant sales manager.*

Bendix Products Div., Bendix Aviation Corp.—**Douglas M. Helier** has been named director of engineering at the Mishawaka plant.

Townsend Co.—**F. C. McKee** has retired as secretary-treasurer, succeeded by **D. C. Fabiani. H. E. Chilcoat** has been named vice-president-general sales manager, and **H. C. Weidner, Jr.**, was chosen vice-president-technical sales.

General Electric Co. — **C. Howard Black** has been named general manager of the new Instrument Dept., while **D. E. Craig** has been made general manager of the new Meter Dept.

*Ross Gear & Tool Co.—Eugene E. Leitner has been appointed vice-president in charge of manufacturing.*

Republic Steel Corp., Hi Strength Steel Div.—**Edward K. Waldschmidt** has been appointed manager of sales.

I-T-E Circuit Breaker Co.—**William H. Frank** was named a director and vice-president.

Union Carbide & Carbon Corp.—**Dr. Augustus B. Kinsel** has been appointed director of research.

Formsprag Co.—**William T. Cherry** has been named manager of application engineering.

Airsupply Co.—**Victor A. Olson** was chosen manager.

Motor Wheel Corp.—**Raymond J. Wilcox** has been appointed executive engineer.

General Electric Co.—**John Muldoon** has become manager of the Michigan sales district for the Carboloy Dept.

Westinghouse Electric Corp.—**H. T. Harrod** has been appointed assistant sales manager for defense products.

All-State Welding Alloys Co.—**Kenneth V. Lutz** has been named general sales manager.

General Cable Corp.—**Arthur Z. Barnes** has been elected assistant to the president.

Bonney Forge & Tool Works—**Spencer H. Mieras** was named general manager, and **Kenneth Foust** was made secretary-treasurer.

Ford Motor Co., Parts & Equipment Mfg. Div.—**C. P. McKelvey** was named industrial relations manager.

Mycalex Corp.—**Joseph P. Gavron** has been chosen assistant to the president.

Ford Motor Co.—**C. C. Donovan** has become manager of a new Union Contract Procedures Dept., Industrial Relations Staff. **J. B. Sheahan** was named to succeed him as industrial relations manager for the Engine & Foundry Div.

*General Electric Co.—Peter J. Jensen was named manager of manufacturing for the Carboloy Dept.*

Caterpillar Tractor Co.—**Walter B. Stephenson** has been named assistant labor relations manager at the Peoria, Ill., plant.

A. O. Smith Corp.—**F. A. Gruetjen** is now director of aeronautical development.

Aluminum Limited Sales, Inc.—**Leo Reierstad** has been chosen to head the new Detroit branch office.

ElectroData Corp.—**James R. Bradburn** was elected president.

Rocky Mountain Metals, Inc.—**G. J. Hoehn** has been placed in charge of engineering and **G. Essendrop** is office and sales manager. **Francis Berger** is chief of maintenance, while **P. Phillips** is in charge of production.

Denison Engineering Co. — **Robert A. Monague** is now field engineer for the Tulsa, Okla., office.

Hyster Co.—**Wilton G. Smith** has been promoted to manager of the New York export office.

Elastic Stop Nut Corp. of America —**Walter H. Riley** has been named regional sales manager for the Michigan, Wisconsin, and Minnesota territory.

Russell, Burdsall & Ward Bolt and Nut Co.—**Foster E. Fike** has retired as manager of the Rock Falls, Ill., plant. **William H. Hoofstitler** succeeds him.

Ford Motor Co.—**Dr. Earle A. Irvin** is now medical director.

Panellit, Inc.—**Walter P. Hooper** is now administrative vice-president of the firm and its Panalarm and Panscan Divs.

Parker Aircraft Co.—**Walter C. Loeman** was named manager of the Check Valve & Fitting Div.; **Donald S. Manning**, manager of the Tube & Hose Fitting Div.; **George A. Fort**, quality control manager for all West Coast Divs.; **Scott A. Rogers, Jr.**, manager of the Rubber Products Div.; and **Ned Shiflett**, manager of the Engine Accessories Div.

Cooper Alloy Foundry Co.—**Arthur Tauscher** was chosen plant engineer in charge of maintenance.

*Lindberg Engineering Co., Field-erected Equipment Div.—E. B. Jones has been named chief engineer in charge of estimating and engineering, and C. P. Masure has been made purchasing agent.*

General Motors Corp. — **Marsden Thompson** has been appointed director of the Customer Research Section. He succeeds **Roland S. Withers**, who has been named merchandising manager of AC Spark Plug Div.

Ford Motor Co.—**V. Y. Tallberg** was named director of engineering administration and executive assistant to the vice-president in charge of engineering.

Dayton Rubber Co., Automotive Wholesalers Div.—**R. G. Roney** has been named sales manager.

Consolidated Vultee Aircraft Div., General Dynamics Corp.—**K. J. Bossart** has been appointed assistant chief engineer, San Diego Div.

*Colonial Broach Co. — Charles H. Crawford is now plant manager*

Surface Combustion Corp.—**William E. Grover** has been made chief erection engineer.

Gar Wood Industries—**E. B. Hill** is now director of sales, advertising, and export.

General Motors Acceptance Corp.—**Charles G. Stradella** was elected president, succeeding **John J. Schumann, Jr.**, retired.

Pacific Airmotive Corp. — **J. W. Baird** has been elected assistant secretary.

Olympic Screw & Rivet Corp.—**E. H. Stau** has been named vice-president and director of sales.

Northrop Aircraft, Inc.—**William C. McDuffie** has been elected chairman of the board.

*U. S. Rubber Co., Tires Div.—Walter F. Brown has been promoted to assistant sales manager.*

Electric Auto-Lite Co.—**Francis M. Wistert** was appointed director of industrial relations; **George H. Souther**, manager of Legal and Patent Depts.; and **F. C. Huebner**, supervisor of work standards.

Carborundum Co. — **Burchard M. Day** has been named advertising manager.

Pittsburgh Plate Glass Co., Fiber Glass Div.—**Richard R. Pryor** was named manager of air filter products sales, and **James G. McGreevy** was appointed manager of battery products sales.

## Necrology

**Charles S. Davis**, 77, chairman and formerly president of Borg-Warner Corp., died July 2, in Paris, France.

**Donald B. McLouth**, 52, head of McLouth Steel Corp., died July 10 at Bloomfield Hills, Mich.

**Robert Swartzbaugh**, 46, personnel director and head of industrial relations for the Electric Auto-Lite plant in Fostoria, O., died July 4.

**Lloyd E. Honeywell**, former advertising manager of National Acme Co. died recently, at Cleveland, O.

**Dr. Saul Dushman**, 70, retired assistant director of the General Electric Co. research laboratories, died July 7, at Scotia, N. Y.

**Charles W. Johnson**, 74, pioneer automobile manufacturer with the "Johnson Steamer," died July 12, at Chattanooga, Tenn.

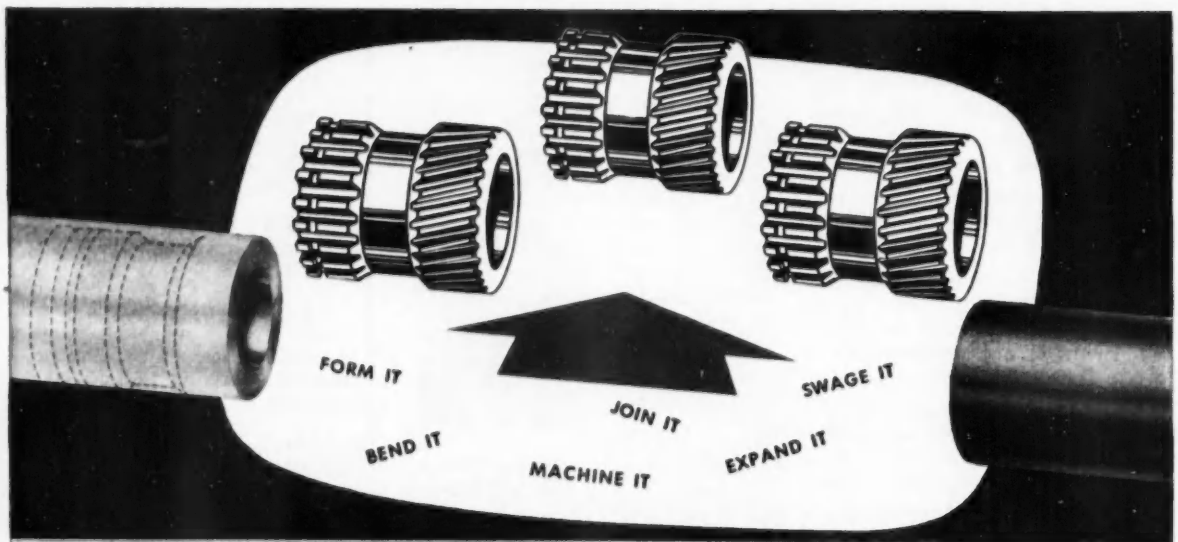
**Robert F. Gloster**, 56, special representative of Studebaker Corp. in the New York region, died July 13, at White Plains, N. Y.

**Ross H. Dickson**, 64, retired assistant secretary of Standard Oil Development Co., died July 9, at Elizabeth, N. J.

# SERVICE
*with*
# B & W
# CARBON STEEL

A — AVAILABILITY
S — SERVICE
Q — QUALITY

SEAMLESS
## MECHANICAL TUBING
***Saves You Time and Money***




**B&W SERVICE INCORPORATES:**

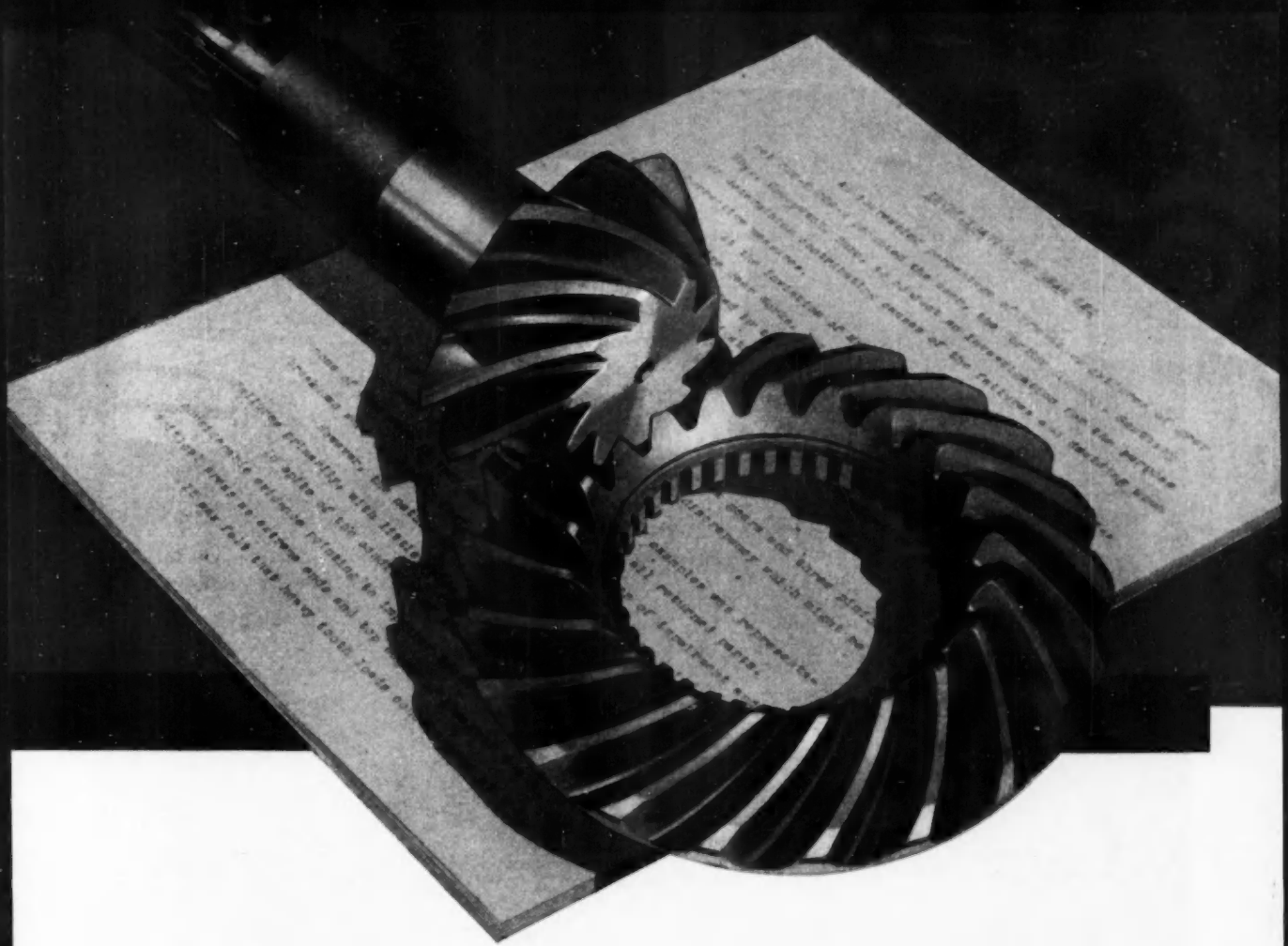
1. Sound engineering assistance on fabricating problems and procedures.
2. Mutual understanding between B&W and its tubing customers.
3. A nationwide network of district sales offices and distributors, both manned by experienced tubing salesmen.

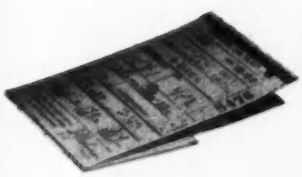
*remember* A S Q *is meant for you*

B&W SEAMLESS and WELDED TUBES

**THE BABCOCK & WILCOX COMPANY**
***TUBULAR PRODUCTS DIVISION***
Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

TA-4050 (CSM)





# BETTER GEARS

## via Pullman and Paper Work

A lot of time, travel, study, and testing can go into the improvement of gears.

The report and gear set shown above is a case in point. The 4,000-word report was prepared from facts gathered at the customer's plant. It details performance factors right down to the ground—pin-points every specification that will produce better gears to do a better job. From this study trial sets were made, tested exhaustively *at* the customer's plant *in* his product.

Then the order was received.

Not all gear problems are as tough as this. But when you're faced with *any* gear problem, write us the facts, telling us where you are and when we can see you.

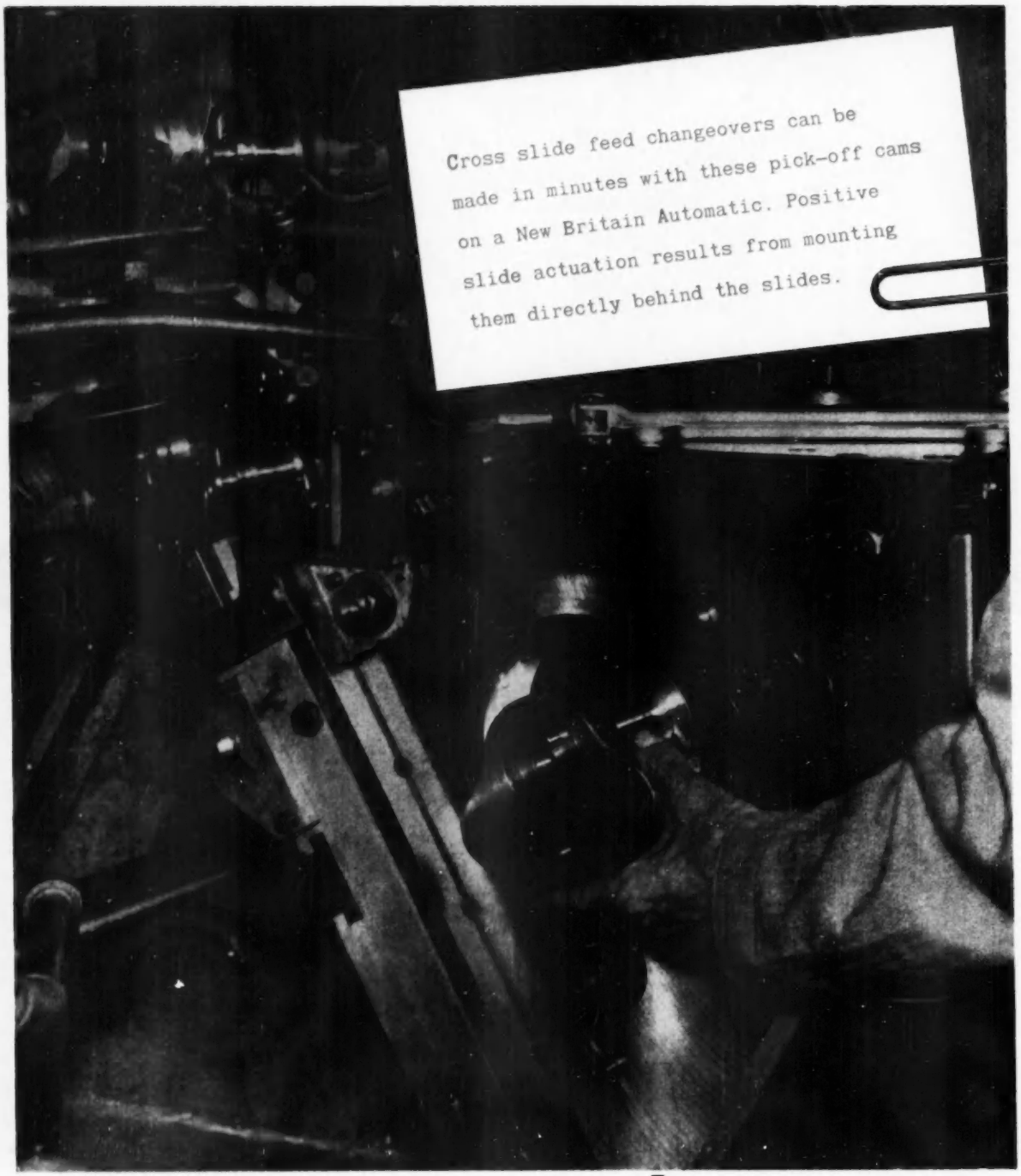
DOUBLE DIAMOND GEARS

FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS
GEAR-MAKERS TO LEADING MANUFACTURERS

# Automotive Gear Works, inc.

ESTABLISHED IN 1914

RICHMOND, INDIANA



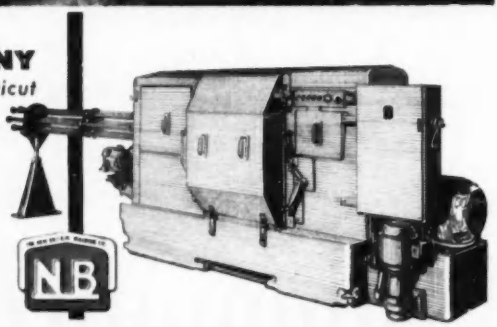

**THE NEW BRITAIN MACHINE COMPANY**

*New Britain-Gridley Machine Division, New Britain, Connecticut*

NEW BRITAIN *Automatics*

***Machines for Making Progress***

Automatic Bar and Chucking Machines
Precision Boring Machines
Lucas Horizontal Boring, Drilling and Milling Machines
New Britain +GF+ Copying Lathes



FOR TODAY'S *Push Button* CONVENIENCES—

# AMERICAN BOSCH
## SMALL ELECTRIC MOTORS

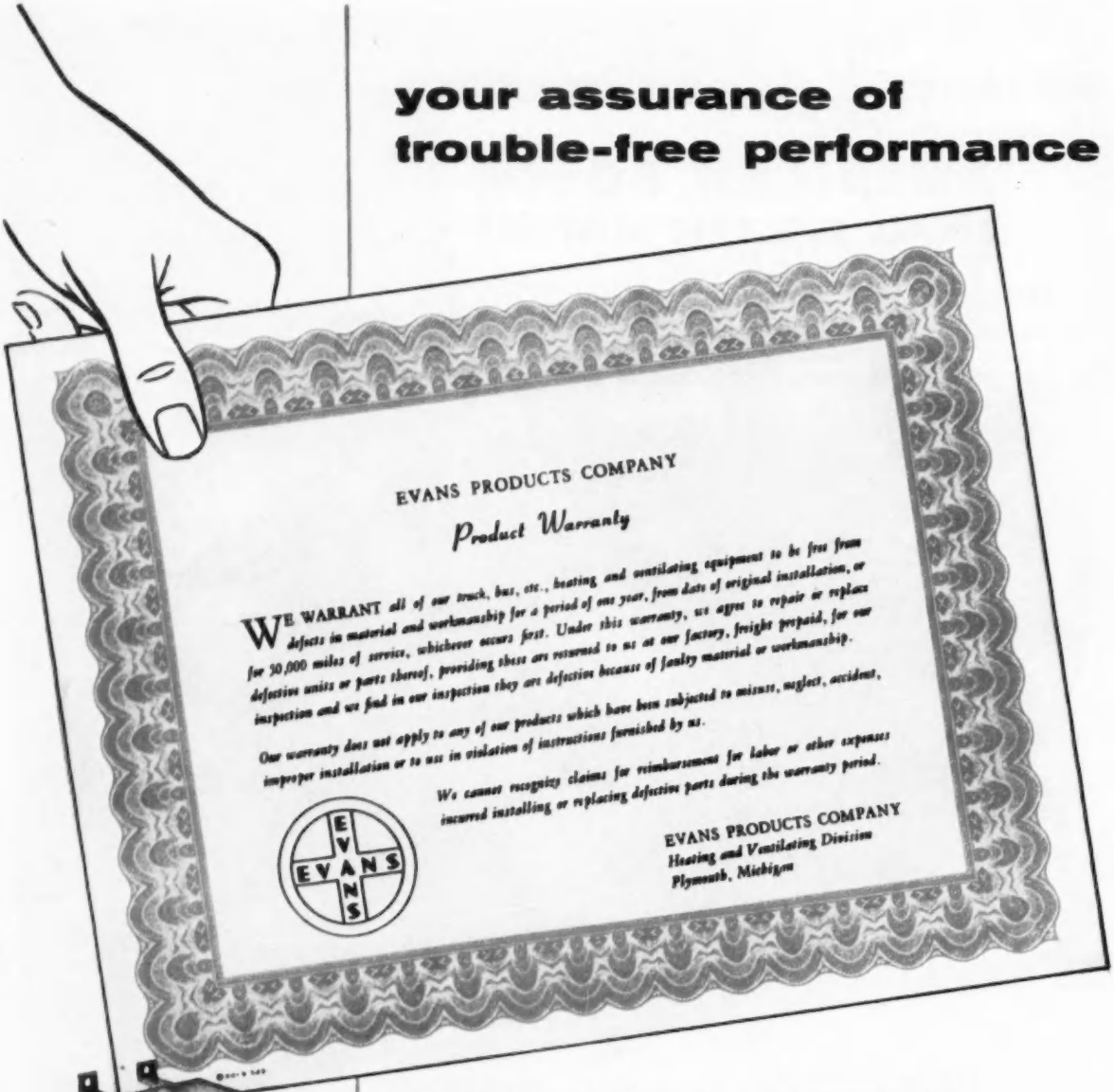
*to power—*

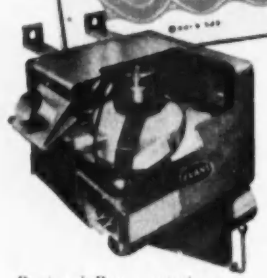
**WINDSHILD WIPERS • SEATS • TOPS • HOODS • WINDOWS • VENTILATORS • STARTERS • HEATERS • TRANSMISSION AND AXLE MECHANISMS**

Well built, with characteristic AMERICAN BOSCH precision quality, these high-torque small Motors are sturdy, quiet, powerful and dependable. Just a few of the good reasons they are already in wide use as original equipment. If you have one or a number of small motor requirements in your designs, put the problem up to American Bosch, Springfield 7, Mass.

# AMERICAN BOSCH

# your assurance of trouble-free performance



## a full-year warranty on every *EVANS* heater

Are you getting the protection of a full-year warranty* on the heaters you buy for your trucks or buses? You are if they're made by Evans. Evans heaters are custom-designed and constructed to meet the particular heating requirements of specific trucks and buses. Evans engineers are glad to work with you to develop a unit to your specifications, build prototypes quickly and conduct precision tests to latest A.S.H.V.E. procedures. For further information write Evans Products Company, **Dept. P-8, Plymouth, Michigan.**

**or, 50,000 miles, whichever occurs first.*

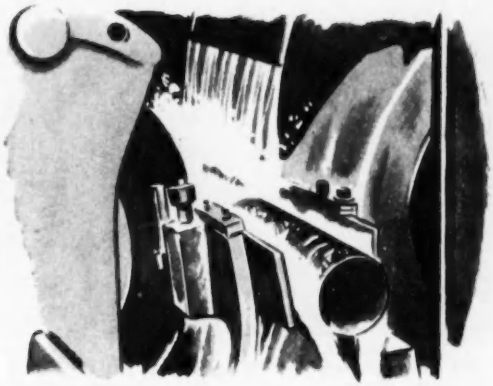
*Regional Representatives*

Cleveland . . . . Frank A. Chase
Chicago . . . . . R. A. Lennox Co., Inc.
Detroit . . . . . Chas. F. Murray Sales Co.
Allentown, Pa. . P. R. Weidner

**EVANS** ... ***BALANCED HEATING & VENTILATING SYSTEMS FOR EVERY TRUCK AND BUS*** ...

# New S.E.C.O. is Tops For These Operations

**CUTTING WITH NEW S.E.C.O.** Tools stay cool—require less frequent grinding. Finishes are uniformly good.



**GRINDING WITH NEW S.E.C.O.** Surface finishes are good. Loading and glazing of wheel are reduced—wheel life is prolonged.

**WASHING WITH NEW S.E.C.O.** Thorough removal of grease and dirt provides clean surfaces for smooth, long-lasting finishes.

**ROLLING WITH NEW S.E.C.O.** Rolls stay clean. You get maximum reductions and low power consumption.

New Sunoco Emulsifying Cutting Oil increases production, cuts operating costs. Its high machining efficiency permits uniformly good finishes, prolongs tool life. Its high detergency and purity keep tools, parts and machines clean. Its excellent mixing qualities permit its use in cold, hard or hot water. Test New S.E.C.O. in your own plant. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AA-8.

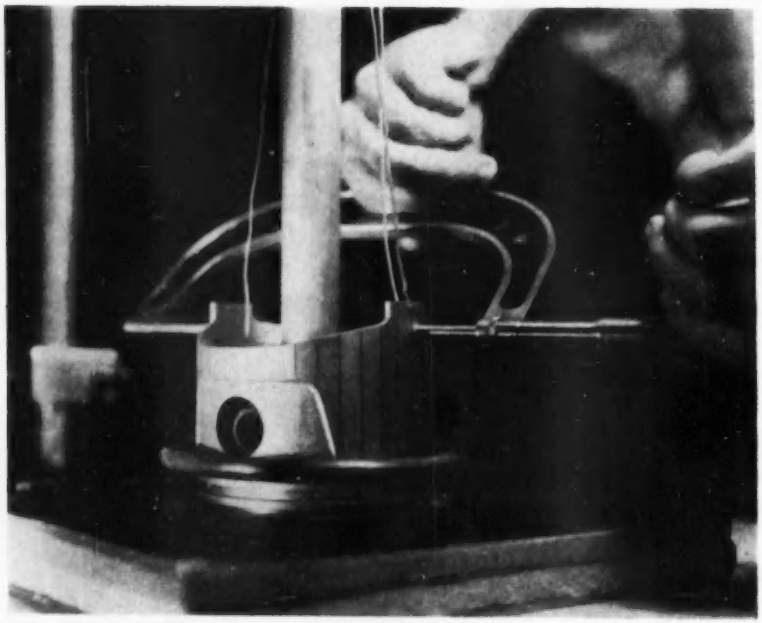
**INDUSTRIAL PRODUCTS DEPARTMENT**

**SUN OIL COMPANY**

SUNOCO

**PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL**

***Refiners of famous High-Test Blue Sunoco Gasoline***

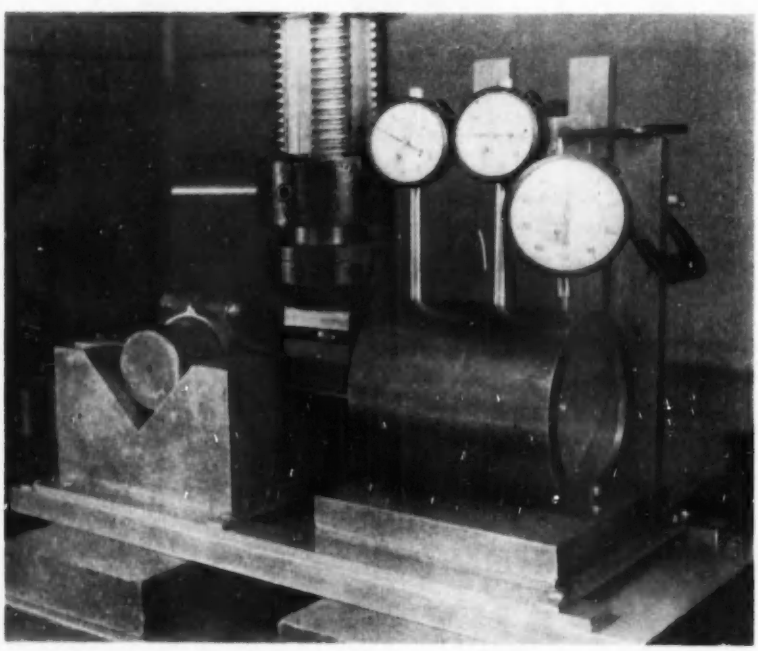


*A perforated tubular ring blasts air on the skirt of a piston with heated head to establish thermal gradients. Measurements during this test supply valuable information as to unrestrained thermal expansion characteristics.*

# Service Life

**This Is the Final Article of Three Devoted to Aluminum Pistons and Based on Material which was Presented at a Symposium Conducted by the Cleveland Branch, Aluminum Co. of America**

ONE of the first steps in testing a piston is to determine the operating temperatures attained in various areas. Different forms of instrumentation have been employed by investigators in the past but any form of direct temperature measurement is complicated by the high speed oscillation of the piston being tested. Far better results have been obtained by Alcoa with an indirect method of temperature determination based upon the drop in hardness of aluminum alloys after exposure to elevated temperatures.

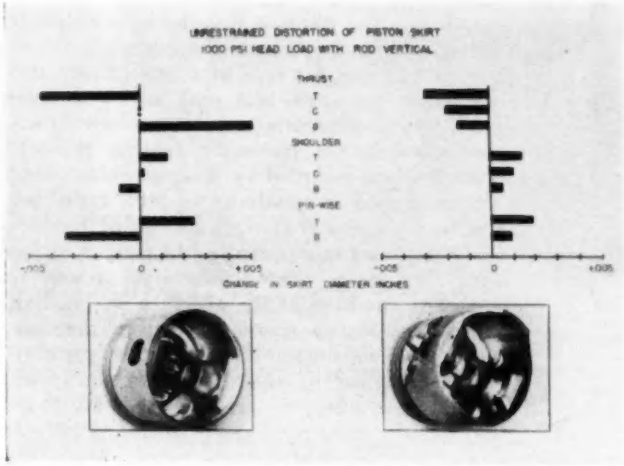


*Side load testing of a piston is effected by applying a force at the center of the connecting rod in this test setup. Skirt deflections are measured by dial indicators contacting the piston through holes in the test cylinder.*

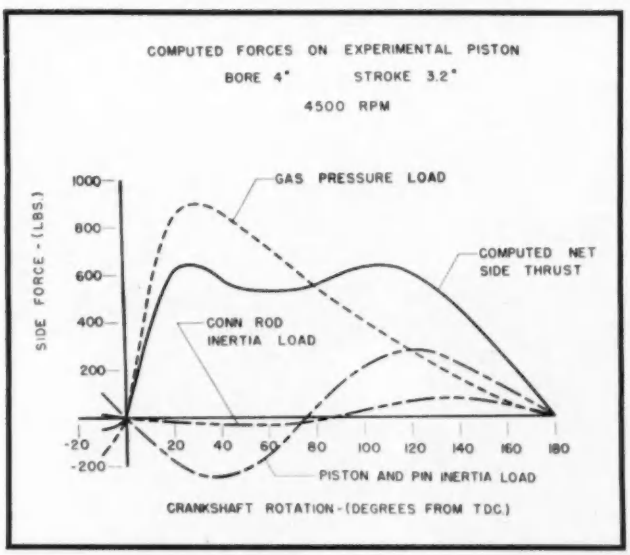
Aluminum alloy pistons are cast from a calibrated heat of metal and age (or precipitation) hardened to develop maximum hardness prior to machining and installation in an engine. The engine is then given a minimum run-in period followed by 30 hours of steady operation at the desired conditions of load and speed. After removal from the engine, the pistons are sectioned and hardnesses measured at desired locations. Reference to a calibration curve of time at temperature versus hardness then determines the mean temperatures in various parts of the piston.

One of the most important requirements of a successful piston is the ability to withstand the loads produced by combustion

# of Pistons Predicted *by Latest Tests*




***Unrestrained distortion due to head loading of two double translot pistons is indicated by the change in dimensions at the top, center, and bottom of the skirt measured in the thrust, shoulder, and piston pin planes.***




***Components of forces acting on a pistor are combined in a net side load, plotted in relation to crankshaft angle during the power stroke of the pistjn.***

chamber pressures. In a modern engine of four-in. cylinder bore, the total load on the head of the piston may reach 11,000 lb during a portion of the cycle. To test the strength of an aluminum piston under this type of loading, a laboratory bench test has been devised whereby the load is applied through a standard connecting rod and piston pin while the head of the piston is on a rubber pad to provide uniform loading. Magnitude and location of stresses then can be determined by means of the action of a brittle lacquer applied prior to testing. More precise measurements of stress can be made by the application of wire strain gages in the areas of interest as indicated by the patterns of the brittle lacquer. Distortion of the piston is also determined in this test by measuring the dimensions of interest under load and comparing them with the measurements at no load.

Side loads on the piston are produced by the angularity of the connecting rod. Testing under conditions of side load is performed by placing the piston in a rigid cylinder of standard bore dimension and applying the load on the center of the shank of the connecting rod with the crank pin end supported. Measurements of deflection under side load are made by inserting the stems of dial indicators through holes in the cylinder so they contact the surface of the piston.

Thermal deformation of the piston under conditions of free expansion is determined by comparing dimensions at room temperature with those at elevated temperature. Special test fixtures simulate operating temperatures in various portions of the piston. Of more interest, usually, is the thermal deformation of a piston under conditions of restraint imposed by the engine cylinder. In this determination, the test piston is placed in a cylinder equipped with a jacket in which water flows at engine coolant temperature. Heat is applied to the head of the piston, temperatures in the piston being controlled while dimensions are determined by measuring over the ends of Invar pins extending through holes in the cylinder wall and contacting the skirt of the piston. The coolant jacket of the cylinder is divided into compartments so that heat flow through the the piston rings and the skirt can be separated and studied.

Information gained from these tests is of extreme importance in the evaluation of the control of expan-


***Stresses in a piston under load are determined by spraying with brittle lacquer. The patterns seen here show the stresses developed by a head loading of 1000 psi. Plus values are tension stresses; minus values indicate compression stresses.***

sion by design. Control can be thought of as the ability to retard the expansion of the thrust faces. Lateral expansion of the piston in the direction of the centerline of the piston pin is considerably greater, and compensation is made for this expansion by the cam-ground contour of the skirt.

A thermal expansion comparison of an aluminum alloy piston of double translot design with an aluminum alloy piston having steel inserts or struts cast into the boss sections indicates that the strut design has less expansion at the shoulders of the skirt. However, under conditions of restrained expansion in the engine cylinder, the strut design will require as much reduction in shoulder diameter because of increased shoulder rigidity. Areas of most interest are the thrust faces, and here the expansion is essentially the same in both designs.

Three factors that have an effect upon the permanent dimensions of a piston are growth, creep, and relaxation of fabricating stresses. Permanent increases in the rigid portions of the head and ring belt may result in partial collapse of the piston skirt across the thrust faces. This effect of growth points up the importance of proper initial thermal treatment of an aluminum piston to minimize growth. The dimensional change of a piston under sustained load, defined as creep, and the relaxation and resulting redistribution of stress can also have an important effect upon piston dimensions. Laboratory and engine testing have shown that the dimensional change in a piston skirt may be influenced more by a combination of growth, creep, and relaxation than by wear.

In laboratory testing under repetitive loading, every effort is made to duplicate actual operating conditions. The piston is installed on a hydraulic test machine in a cylinder of standard bore at an angle of six deg for it is at approximately this connecting rod angle that peak explosion pressures occur. Appropriate thermal gradients are maintained in the piston by heating elements controlled and recorded by thermocouples. Load can be applied at speeds up to 2000 cycles per minute through a production connecting rod and piston pin, used to standardize the rigidity of the setup. To insure that a fluid type of load is applied to the head of the piston, a low melting point alloy, highly plastic at testing temperatures, is placed between the piston head and combustion chamber of the dummy test cylinder. Regular test schedules are used that facilitate the detection of incipient cracks caused by fatigue under these conditions. This type of test is an extremely effective tool in the preliminary determination of a satisfactory aluminum piston design.

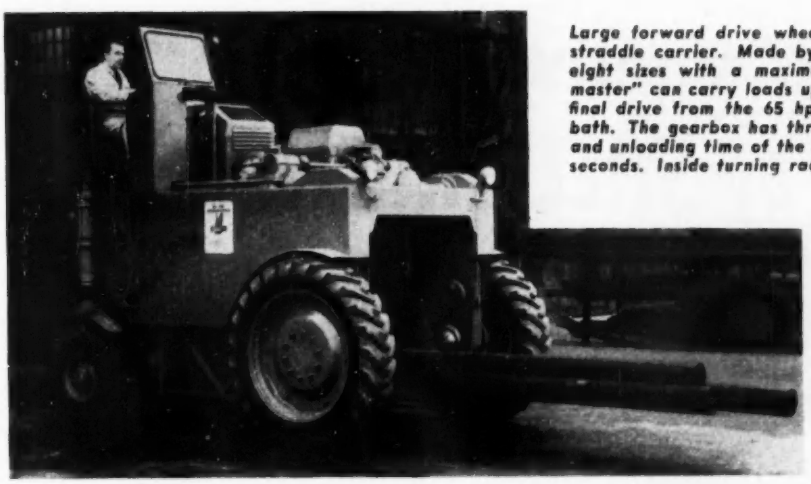
Correlation between fatigue machine and engine testing on a dynamometer has been established. As an example, the specification may require that a piston

(*Turn to page* 104, *please*)

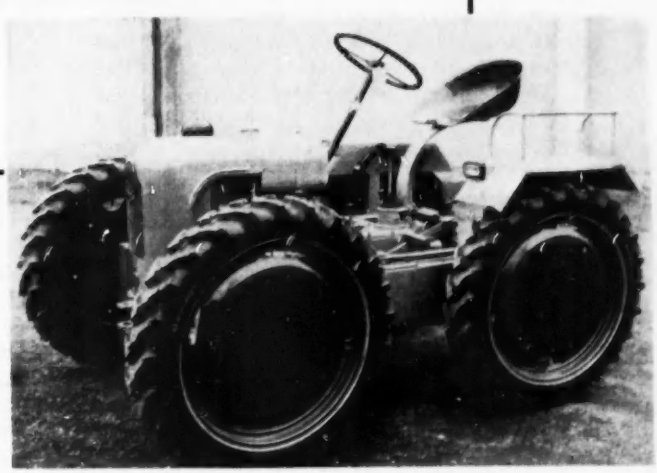

***Cam contour of piston skirt as well as the fit of the piston in a cylinder have a marked effect upon the bearing patterns of thrust faces under side load conditions, as illustrated here.***

# Unusual European Vehicles

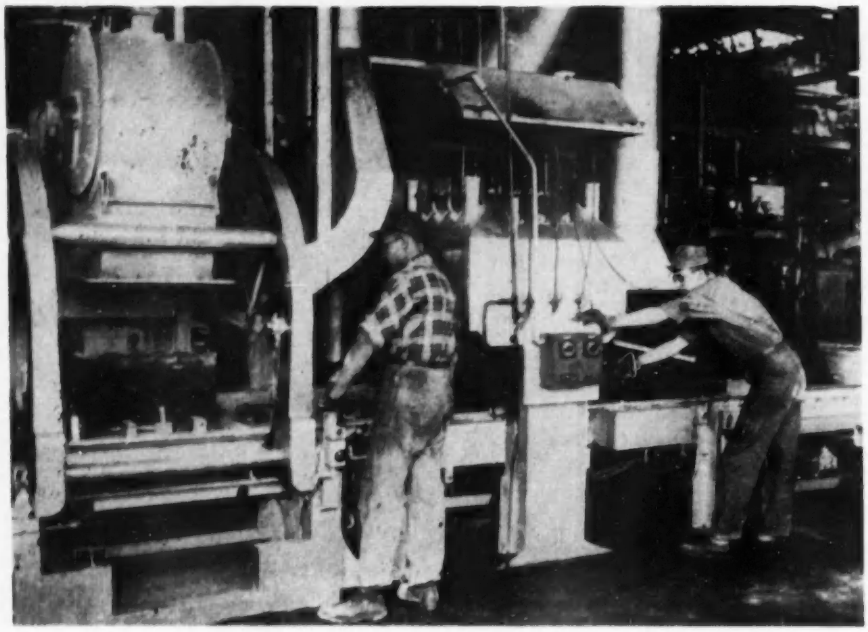
*This British road roller built by E. V. Twose, Ltd., is designed to carry a Ferguson tractor as a power unit. The tractor is backed up a portable ramp into position, and sprockets bolted to the rear wheel hubs drive the rollers through chains. Its hydraulic implement lift raises the drive wheels clear of the support frame and maintains adjustment of the chains. Differential and brakes work in the normal manner. Steering to the front roller is by a special removable column. No modifications to the tractor are required, and attachment or dismounting of the combine takes less than 10 minutes.*



*Large forward drive wheels improve traction of Britain's first straddle carrier. Made by British Straddle Carrier Co., Ltd. in eight sizes with a maximum capacity of 10 tons, the "Steelmaster" can carry loads up to five ft sq in section. Roller chain final drive from the 65 hp Perkins Diesel engine runs in an oil bath. The gearbox has three speeds in both directions. Loading and unloading time of the mechanical lift with rigid hooks is five seconds. Inside turning radius is nine ft and max speed 25 mph.*



*Steering as well as drive on all four wheels is featured on the 10 hp German Urus Allrad tractor. With duplicate implements hydraulically-carried at the front and rear, it can plow in both directions without turning around. Four-speed gearbox is reversible, and the bucket seat may be swung around the central controls to face rearwards. Box-section frame members house the two longitudinal drive chains which run in oil.*



*This machine was built at Indianapolis Works by the Plant Engineering department, and is used at present to produce shell molds for two exhaust seal rings and two exhaust pipe flanges. The rollover sand hopper at the left deposits the sand-and-resin mix upon the pattern. The hood-type radiant gas oven in the center cures the outside of the mold. The station directly behind the operator at the right strips the mold from the pattern.*

# *More* Automotive Parts *by* SHELL MOLDING

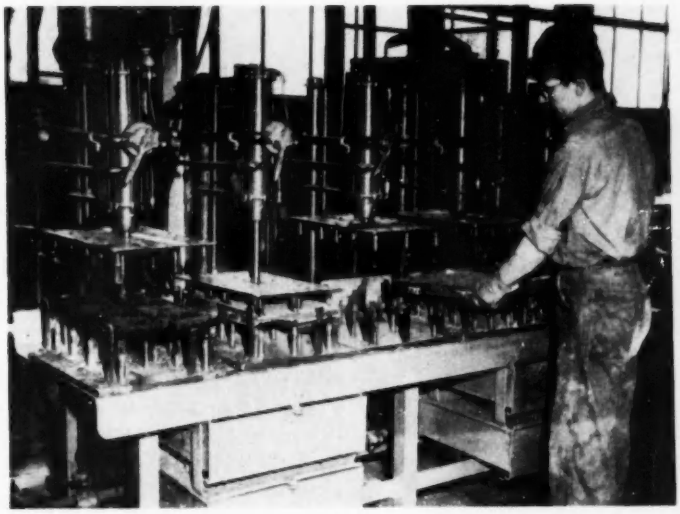
## *Special Machines Developed at Indianapolis Plant of International Harvester Co. for Automatic Production of Molds*

**By Joseph Geschelin**

CONTOUR Molding (registered trademark), a distinctive version of shell molding, was previewed recently at the International Harvester Co., Indianapolis Works Foundry where the process has been in operation for some time. At this writing they are producing two exhaust seal rings and two exhaust pipe flanges, the parts being used as cast, thus eliminating a variety of machining operations formerly required with green sand castings.

At the same time experimental production has been established on two larger parts—a flywheel and a brake drum. The flywheel is produced to such close tolerances and fine finish that machining is required only on the clutch face, without complicating the normal balancing procedure. Incidentally, because one major face is used as cast, the resulting shell molded flywheel has higher tensile properties, and shows higher endurance values on the spin test. As the technique is capable of producing such fine and smooth surfaces, IH is studying the possibility of employing it for intake and exhaust manifolds as well.

Since it is necessary to start from scratch with an advanced technique, the management has deliberately chosen the simpler parts first and will gradually expand the scope of the operation through a survey now under way among IH plants to determine the parts that may be produced most economically. Judging by its initial experience the company estimates that perhaps 10 per cent of all foundry jobs eventually may be shifted to shell molding. One of the most encouraging features from the management point of view is that the process has been integrated with the existing



*Air-operated squeeze presses are used to assemble the two halves of a mold into a complete shell mold. The two halves of a mold are made together on the same pattern, then are separated manually and adhesive applied to the halves. The halves are assembled and placed in these presses while they are still hot in order to get a fast set-up of the adhesive.*

*Operators place six complete molds in a flask and over a common runner bar on a jolt machine. In this position the flask is ready to receive molding sand to back up the molds for pouring. The flask is picked up off the jolt machine, turned over while hanging on the hoist, and set on the mold cars for pouring.*

foundry facilities. It has not required either expansion or new equipment except for the special equipment items required for producing the resin molds.

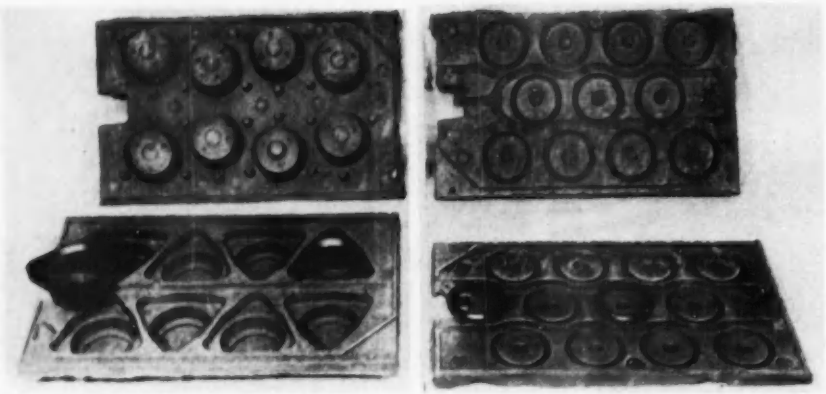
In common with others who have embarked on a shell molding program, IH has found the following major advantages: better surface finish; closer dimensional tolerances; less machining allowance—some applications eliminating all machining, others eliminating part of the machining, still others requiring less metal removal; generally improved machinability due to better structure, absence of surface sand inclusions and hard spots; in some cases an improvement in physical properties.

Perhaps the major problem involved in the process is the high cost of resin. IH currently uses about six to seven per cent of resin with the special sand mixture but is experimenting to seek ways of reducing this percentage. One promising approach lies in the availability of a new type of coated sand now being exploited. On the other hand, the cost of resin already has been reduced, doubtless due to the larger volume of consumption. Even under these circumstances, the technique holds considerable economy since the simpler applications already compete with green sand molding, while others can be selected on the basis that overall costs including machining will be competitive or lower. One rough rule, already tested experimentally, is that if casting weight from each mold is at least twice the weight of the resin mold, foundry cost will compare with conventional green sand practice.

Apart from the economy of the method for carefully selected parts, it is anticipated that shell molding will tend to improve product design as well as machine shop practice. One important by-product, already noted, is that the emergence of the new process has impelled foundry equipment manufacturers to develop advanced methods that may well establish conventional foundry methods on a higher level.

*This shell molding machine will be used for producing flywheel casting molds. This view shows the two halves of the mold resting on the ejection pins (pressed up from the patterns) ready to be removed from the machine.*

Let us consider in some detail the present setup for shell molding at IH. The smaller molds are being



*Samples of exhaust pipe flanges and exhaust seal rings made by shell molding are shown here, together with the mold halves which form complete molds when assembled.*

produced in a completely automated Contour Molding machine designed and built by the Indianapolis Works. The steel or cast iron patterns, all made to a standard size of 20 by 24 in., move through the unit on an automatic conveyor. The machine has a two-position preheat—an infra-red oven, and a gas-fired oven, designed to heat the patterns to 450 F. Sand-resin coating of the pattern is done in another station, operating as an automatic roll-over machine. Here the resin-sand mixture is permitted to cover the pattern, the thickness of the resin mold being a function both of temperature and time. Under present operating conditions the shell runs from 3/16 to ¼-in. in thickness. Upon completion of the cycle, the pattern is rolled over to return the unused sand mixture, then brought back to the original position for unloading from the station.

The pattern then moves to the next station where the shell mold is cured in a hood type radiant gas oven at a temperature of 900 F. Stripping of the shells is done at the next station by means of an air push-off type mechanism.

Although there are many ways of sealing the halves of the shell mold, IH has elected to employ a polyvinyl resin in liquid form for this purpose. The operator runs the viscous material around the periphery of one shell, then places the mold in an air-operated squeeze press which holds the halves firmly while the resin sets.

The IH machine can handle eight patterns at a time, producing a mold every 45 seconds. To keep production on the machine at full capacity, as many as 15 patterns should be available due to some of the parts being "short run" parts; and that is the present goal in seeking other good applications. The company also has installed a single-purpose shell molding machine, built by an outside supplier, to be used for producing flywheels and brake drums. Initially the cycle runs slightly under three minutes per mold. However, some changes are being incorporated in the pattern heating equipment that promise to reduce the complete cycle to about 90 seconds per mold.

It is of interest that the present 20 by 24 in. patterns allow the nesting of 11 exhaust seal rings in one mold; or three large exhaust pipe flanges; or eight of the smaller exhaust pipe flanges in one mold.

After the shell molds are produced in this compact equipment section, the rest of the job is done in the regular foundry lines. In preparation for pouring, six molds are assembled in a vertical position in a large flask mounted on a jolt machine. A distinctive feature of IH practice is the use of a common runner for pouring. The pattern for the common runner is a shaped steel bar located on the bolster plate. The sand back-up operation leaves a deeply formed runner connecting across the shell molds.

Once the assembly of the six shell molds has been completed, the flask is filled with sand for back up, jolted to pack it securely, and rammed carefully by hand to avoid damage to the shell molds. The flask is rolled over to bring the common runner on top. The mold then is placed on the conventional pouring conveyor to follow the regular pouring and shakeout procedures, followed by cooling and cleaning of castings in routine fashion.

The extra fine sand for this process is stored in a specially built concrete block silo of 500-ton capacity, designed to preserve the initially dry sand in good condition. Sand and resin are mixed in a Simpson muller located directly above the shell molding machines. The muller can mix 3000 lb in a 15-minute cycle, emptying the mix into a 5000-lb hopper from which the mix is fed into the two machines by screw conveyor.

Although the process now in effect appears simple and routine to the eye, shell molding requires a great deal of study and experimentation before it is ready for production. The research program at IH was initiated in 1949 by its Manufacturing Research Department in Chicago. The Indianapolis Works foundry was the first production foundry in the company to start pilot work and to get into casting production. The pilot system was first installed in September, 1951, the production installation being started August, 1952. Contour molding of the initial group of four castings, mentioned here, was started February, 1954.

# AUTOMATIC CONTROLS *increase specialized* Engine Applications

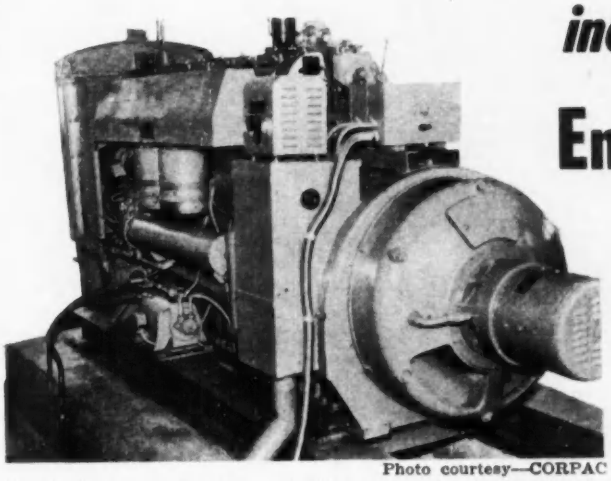


Photo courtesy—CORPAC

***Here is the compact and clean looking automatic starting Murphy Diesel, 127-kw generator set installed in the Pan-American Grace Airways (Panagra) airport at Limatambo Airport outside Lima, Peru.***

PIONEER in robot controls — automatic control devices — for internal combustion engines, Synchro-Start Products, Inc., has given impetus to many specialized applications of industrial engines, opening new market possibilities for gasoline, gas, and Diesel engines in many diverse fields. Recently the company moved to its new home in Skokie, Ill., where it has ample space for manufacturing as well as basic research.

In recent months, the company has released for production a new line of solenoids; and a group of speed sensitive controls, one type adaptable to standard distributor take-off drives, the other for the standard SAE tachometer drive. They are designed for automatic two-speed operation, for example, cutting out a starting motor and providing overspeed protection with manual or automatic re-set.

Since the company produces a wide variety of control devices suitable for most internal combustion engines, a generalized picture must be employed to illustrate how an engine is provided with full control. In a typical case, when there is a demand on a stand-by engine, a switch is closed to automatically open and close all circuits necessary for starting the engine—water valves, fuel valves, cranking circuit, solenoid-operated governor controls, etc. As soon as the engine starts, the control set stops the starting motor and breaks all circuits required for cranking, holding closed the circuits necessary for engine operation.

The control set also is arranged for short schedules of cranking if the engine fails to start at once, repeating interrupted starting until five efforts have been made, then will automatically disconnect and energize a suitable alarm or signal. This is a generalized picture of events, the cranking cycle being capable of variation for specific installations.

Provisions also are made to handle abnormal conditions while the engine is running — overheating, oil pressure failure, overspeed, etc. In such event the engine is automatically shut down and a circuit is energized either to operate an alarm or to start another stand-by engine.

In recent years many interesting applications have been made of stand-by power, illustrating some of the scope of this control. Some time ago the American-Arabian Oil Co. installed eight units to provide emergency power for pipe line operations. Other uses are: for hospitals, department stores, ventilating fans for mining operations, municipal sewage pumping systems and town incinerator systems, stand-by units in glass plants and china manufacture, auto-

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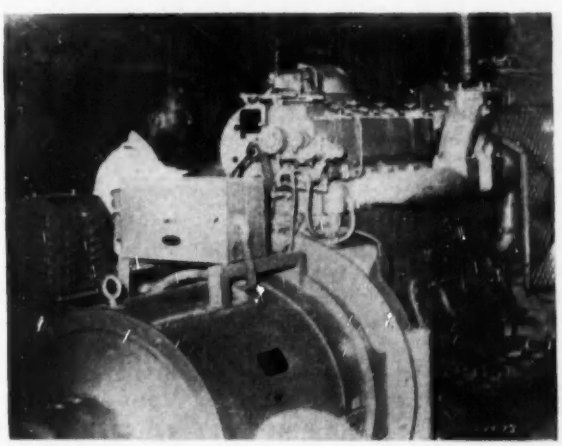
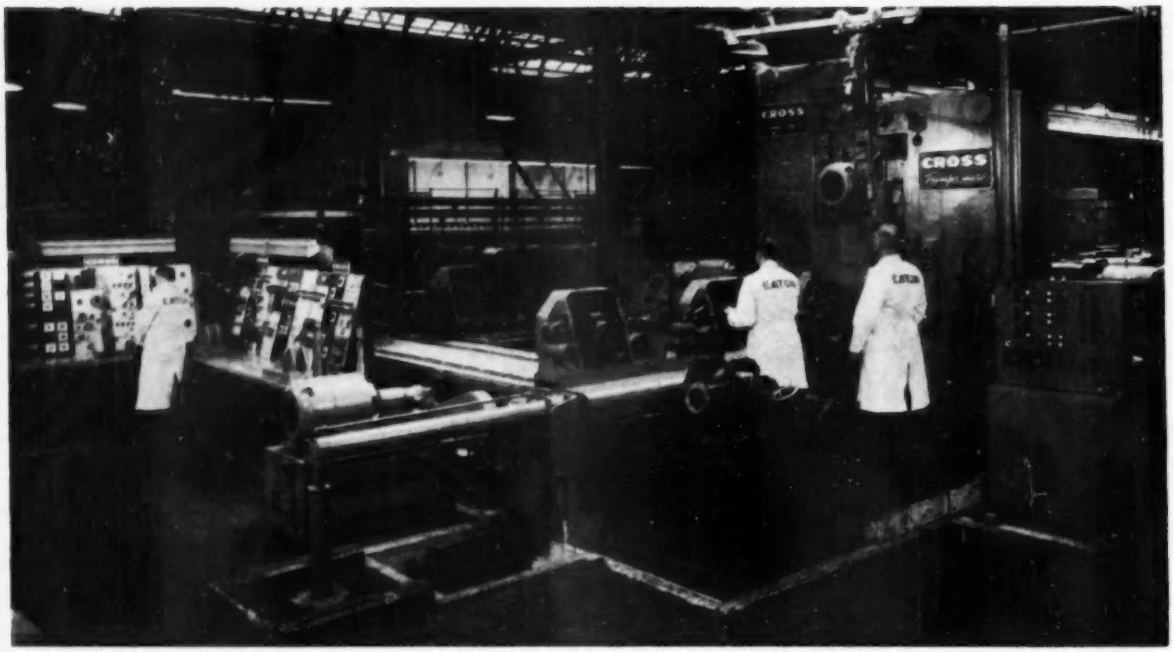


***Sears, Roebuck & Co. recently installed this Murphy Diesel, 76-kw, 50-cycle, automatic starting generator set in its establishment at Caracas, Venezuela. Recent reports indicate that almost daily power failures in the area have made it necessary for the plant to run several times a day.***




*View of loading end of one of the two large installations of Cross Transfermatics for machining differential carriers for Eaton two-speed axles. The typical Cross Tool-O-Matic boards may be seen at the extreme left in the background.*

# Combined Operations Increase Productivity at Eaton's Axle Division

IMPACT of a continuous program of equipment replacement in the Axle Division of Eaton Manufacturing Co. in Cleveland, is bearing fruit in the form of advanced methods, increased productivity, and the combining of operations that make for better utilization of manpower.

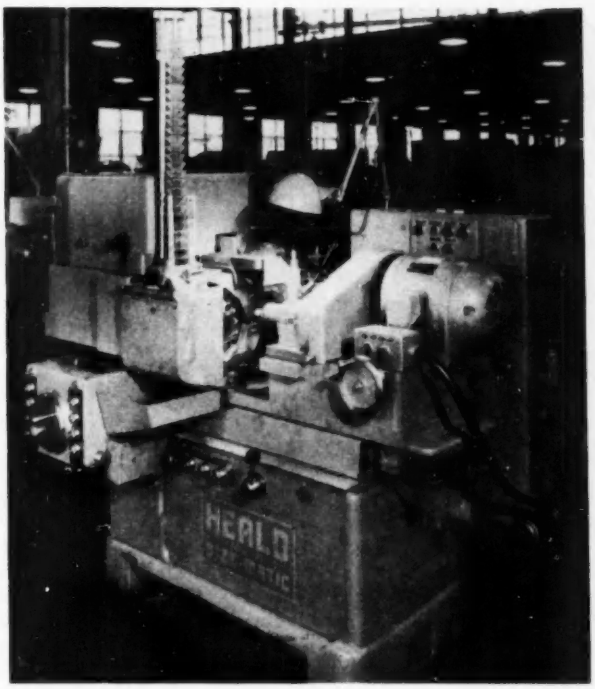
Most noteworthy index of current activity is the recent installation of two large, nine-station Cross Transfer-matics for performing most of the detail operations on two large-volume malleable iron differential carriers for Eaton two-speed axles. Since both machines are quite similar in design, the illustration is typical, although the machine for the larger carrier includes several additional heads and operations. As shown, each machine is served by a platen type conveyor on which are mounted the massive two-position fixture. Operations are completed in a double-index cycle, one piece being finished for each cycle of the conveyor fixture.

The machine shown here handles 97 operations, including—60 drilling, chamfering, and reaming; five milling; four spotfacing and counterboring; and 28 tapping. With a double-index cycle, the machine takes in the following sections of the work: pedestal holes; shifter cover; bracket pad; oil scoop hole; shifter shaft hole; and miscellaneous.

Each machine is served by one of the familiar Cross Tool-O-Matic boards, providing storage for preset tools for each station as well as providing calibrated timers for gaging normal tool life expectancy.

The gear department is being treated to some outstanding items of equipment, most recent arrival being a battery of Gleason Dual Revacycle machines. When the Revacycle machine was first introduced some years ago, it represented a distinct advance in the production of differential gears and pinions with the development of automatic loading and unloading —an early example of automation. The Dual Revacycle represents the next and most recent stage of development. Here the rough- and finish-gear cutting machines are tied together into a battery with a unique automation mechanism that not only provides automatic loading and unloading of each machine but an automatic transfer from the rougher to the finisher as well.

Fitting admirably into this program of increasing productivity through automatic loading and unloading is the application of No. 170 Heald Size-Matic internal grinders for finish-grinding differential pinion bores.




***Heald Size-Matic is an excellent example of individual machine automation at Eaton. Grinding of pinion bores has been made entirely automatic by means of automatic loading and unloading. The extended magazine seen at the left is kept loaded with pinions, the loading mechanisms below handling the loading at the work station.***

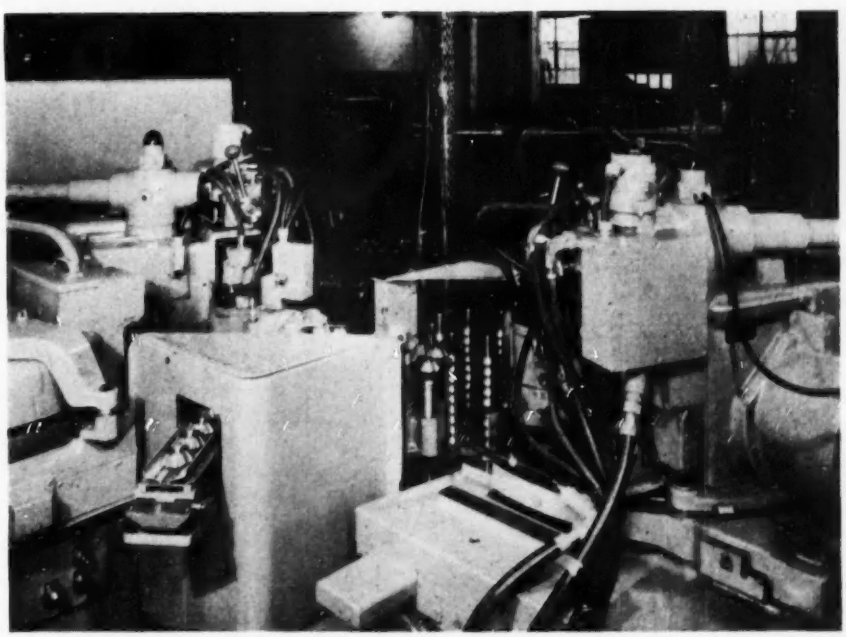
The machine is fitted with an extended magazine for feeding pinions one by one to the work station. The chuck is arranged to hold the pinion on the pitch diameter so as to assure concentricity with the bore. The bore is ground to a total tolerance of 0.001 in.

Eaton is progressively introducing special items of equipment on operations where two or more operations can be combined in a single cycle by means of double-index, as in the case of a National Acme Gridley, or by special tooling arrangement. The differential adjuster—of ring shape—is an example of this advanced program. One face of the ring has a series of lugs, both faces as well as the bore now being finished in a single setting in a National Acme-Gridley four-spindle chucking machine. Work is chucked on the inner diameter of the lugs, the work being held under pressure by means of a hydraulic cylinder until the chuck bites securely. The installation of the new machine is fully justified by its ability to finish the part in a single cycle instead of several individual machine operations.

The differential case is another example of combining operations in a single cycle. Here the three required operations—turning the pilot, boring, and generating a spherical seat are effected in a single setting in a Model 321 Heald Bore-Matic, provided with a special cluster of tooling.

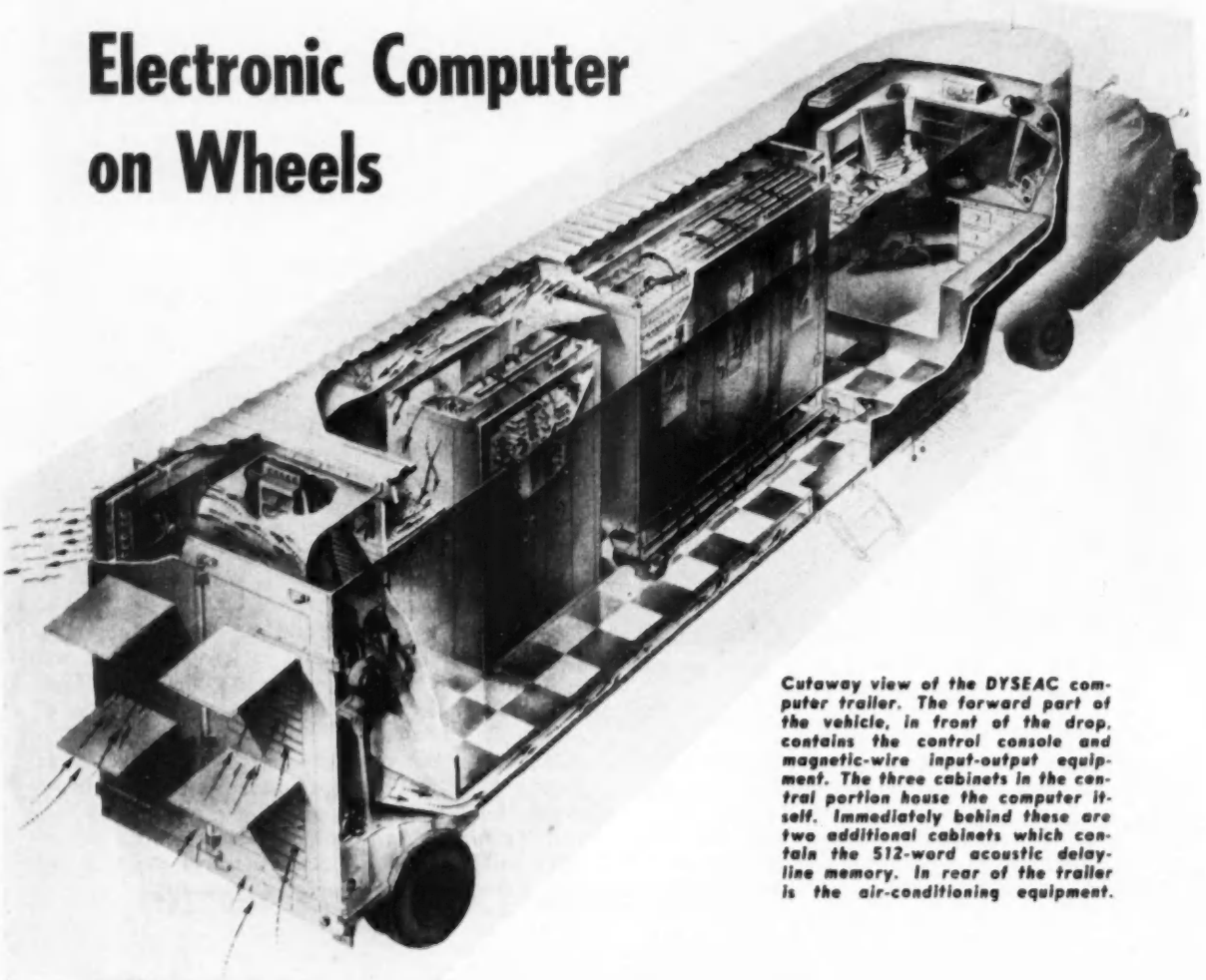
Important improvements are being effected in Eaton's heat treating department. One of the interesting items is the large Electric-Furnace gas carburizing furnace installation provided with a row of three pusher conveyors. Each conveyor can be timed

(*Turn to page* 104, *please*)

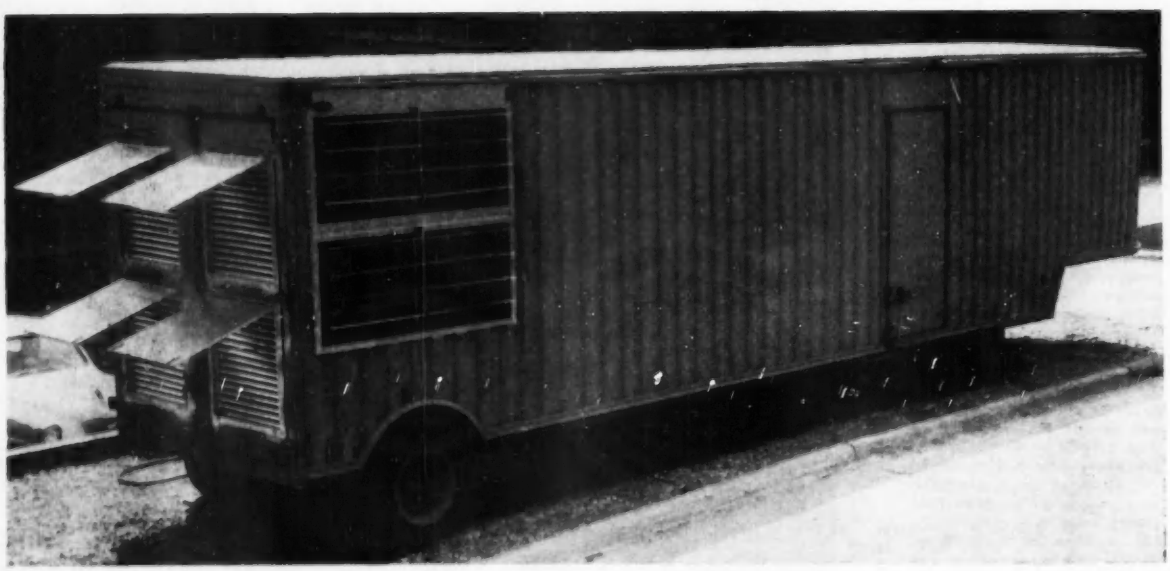


***Latest development in the operation of the well-known Gleason Revacycle equipment is the Dual Par-cycle unit seen here. It consists of two Revacycle machines — a rougher and finisher for differential pinions. Each machine is served by automatic loading and unloading but the two machines now are connected by a common transfer mechanism which transfers parts from the rougher to the finisher automatically. Finished pinions come out of the finisher at the left as shown.***

# Electronic Computer on Wheels



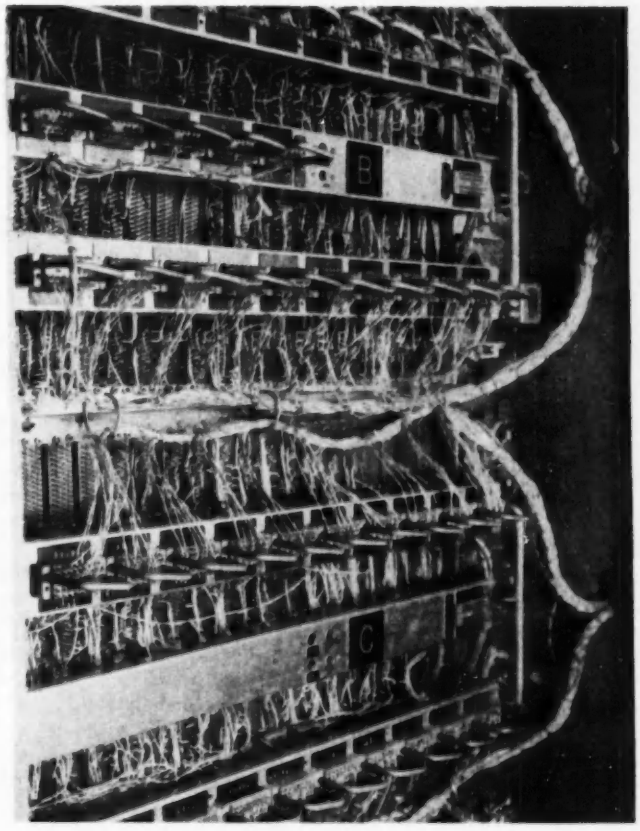
*Cutaway view of the DYSEAC computer trailer. The forward part of the vehicle, in front of the drop, contains the control console and magnetic-wire input-output equipment. The three cabinets in the central portion house the computer itself. Immediately behind these are two additional cabinets which contain the 512-word acoustic delay-line memory. In rear of the trailer is the air-conditioning equipment.*



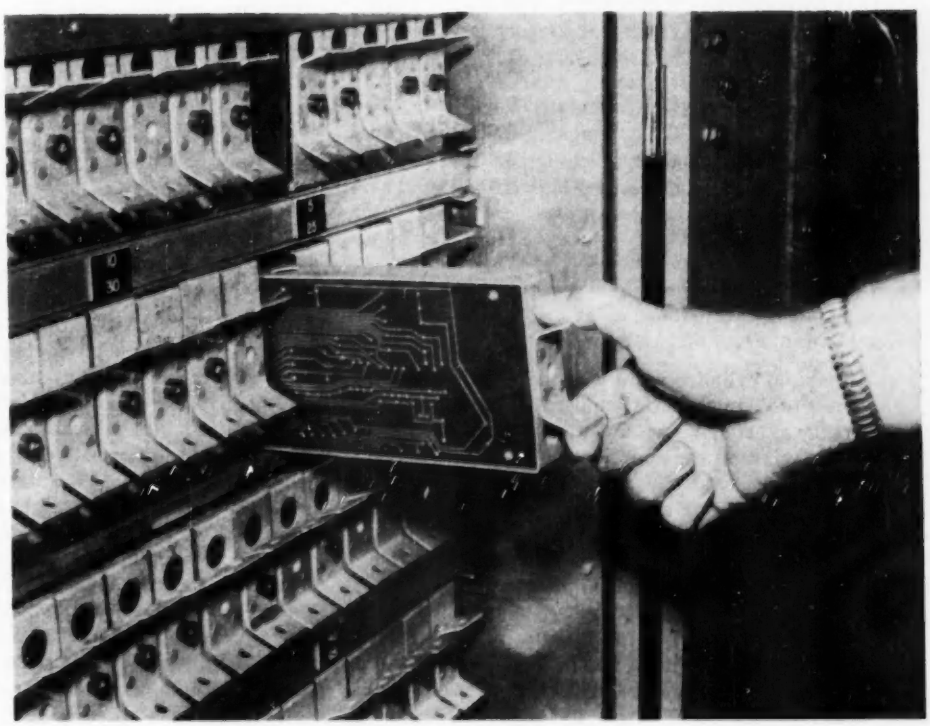
*The computer is carried in this 40-ft trailer van. Louvers in the rear are for air intake and exhaust for air-conditioning the equipment. A similar trailer houses the d-c power supplies, additional input-output equipment and a work space for personnel.*

A HIGH-SPEED digital computer designed to serve as the experimental nucleus for a complex data-processing network, has been completed by the National Bureau of Standards. The flexibility with which this machine controls and responds to a variety of external devices, which may include one or more full-scale computers of similar design, should facilitate the exploration of diverse new areas of interest. Examples include the automatization of industrial and commercial operations, such as the "automatic factory" and the "automatic office," or any field where rapid information-processing and real-time control systems are necessary.

Known as DYSEAC, the new computer utilizes electronic circuit techniques similar to those used in SEAC, the National Bureau of Standards Eastern automatic computer. These dynamic circuitry techniques involve the performance of all logical operations by diode gating, the use of electrical delay lines for all incidental pulse storage, and the use of transformer-coupled pulse amplifiers utilizing only one tube type for all amplification. In DYSEAC, this circuitry has been reduced to standardized packages. Only two types of etched-circuit plug-in packages are required as basic building blocks in this machine. Thus, it has been possible to use modular construction throughout the computer and to simplify design, construction, and upkeep.



*Wiring detail on rear of rack, which contains four chassis or as many as 320 packages. All terminals are readily accessible for testing and signal tracing.*



*Much of the computer circuitry has been reduced to standardized packages. Because of the general similarity of the circuits of most stages, only two types of etched circuit packages are required as basic building blocks in this computer; tube packages and delay-line packages. Here, an operator is inserting a delay-line package. This modular construction has been used extensively throughout the NBS machine to simplify design practice, connance. Nearly 800 of these packages provide for about 90 per cent of DYSEAC's total circuit requirements — exclusive of the 400 stages in the acoustic memory and input-output equipment*

# Corrosion is a Major Cause of Wear in Engine Cylinders

**By Oscar W. Wuerz**
**Cab Service & Parts Corp.**

PASSENGER car operation of the kind taxicabs undergo in New York City provides a good test area for studying engine wear under "stop and go" driving conditions with frequent accelerations and a big percentage of idling. One of the largest fleet maintenance firms in this field, Cab Service & Parts Corp., has reported the effect of an additive type oil on cylinder wear.

High oil consumption and excessive blowby dictate the need for engine overhaul, a high-cost item with taxicab operators. Based on data taken over a period of 20 years on a 1600 to 2000-car fleet, this firm determined that top cylinder wear was the limiting factor in engine life. Atmospheric temperature and thermostat setting affected wear, and rate of fuel consumption also affected oil consumption.

**VARIABLES AFFECTING CYLINDER WEAR**

| | Rate In./1000 Mi. | Per cent Reduction in Rate |
|---|---|---|
| Straight Oil — C. I. Rings | 0.000184 | 0.0 |
| Straight Oil — C. I. Rings* | 0.000156 | 15.2 |
| Additive Oil — C. I. Rings | 0.000076 | 58.7 |
| Additive Oil — Chrome Rings | 0.000014 | 92.4 |

* 180 F Thermostat

Their data lead to the conclusion that corrosion rather than friction or abrasion was the major item causing cylinder wear. To overcome this condition various additive oils were tried on a small scale from 1945, but none appeared economical until 1949.

Exclusively additive oil was first supplied to the 1950 fleet. The firm used a Supplement No. 1 oil throughout the service life of the fleet except for some vehicles which received one filling of break-in oil. This fleet had a six-cyl, L-head engine with aluminum cam-ground pistons and chrome-faced top rings. Figure 1 shows the wear rate in inches per thousand miles, for the 1950 fleet compared with two earlier fleets using straight oil and equipped with cast iron top rings. The broken line for the 1950 fleet indicates the wear rate for ten vehicles which were equipped with cast iron top rings as a control.

Top cylinder wear was measured on 320 engines of the 1950 fleet selected at random. The distribution of the data represented by the curve marked 1950 was as follows:

75.4 per cent were wthin plus or minus 0.0005 in.
5.0 per cent were outside the low limit.
19.6 per cent were outside the high limit.

Analyzing the 19.6 per cent of the engines that showed high wear, they found that 13.1 per cent were between plus 0.0005 and 0.0010 in. of the curve. The trend of wear for this group is normal, that is, it increases with miles but stays within the limits. No serious trouble would be anticipated. They would in all probability require reringing at lower mileage.

Wear of the 6.5 per cent remaining in this group was abnormal, probably due to lack of absolute control over the drivers. The firm felt justified in disregarding this particular group.

The 5.0 per cent showing extremely low wear merely indicated good drivers and strict adherence to maintenance schedules. This group would represent the ideal but it is not good business to attempt to hold a large fleet at this level of performance.

Disregarding the very high wear group of engines, 80.8 per cent of the data are within the plus or minus 0.0005 in. limits.

Top cylinder wear of this order allowed effective ring jobs without reconditioning cylinders. Only five per cent new pistons were necessary. Longer ring service life for the 1950 fleet compared to the 1948 fleet, the latter using straight oil and having cast iron top rings, is shown in Fig. 2, covering an 18-month period. Reringing time for the 1950 fleet was determined by lower cylinder, piston and ring wear.

The table gives quantitatively the effect of the various ring and oil combinations. The effect of chrome rings is appreciable, almost 34 per cent. However, the most outstanding benefit was obtained through the

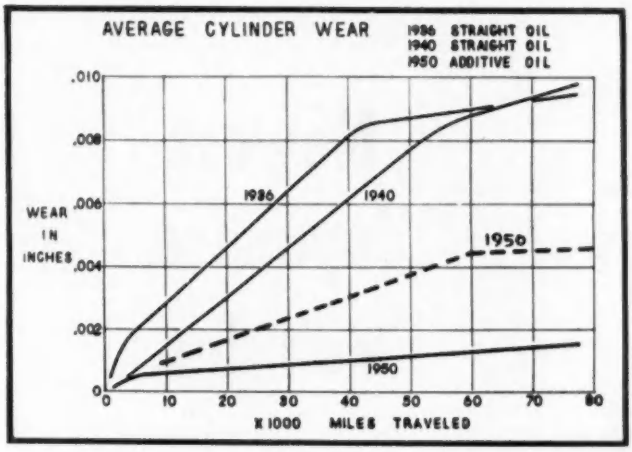



FIG. 1

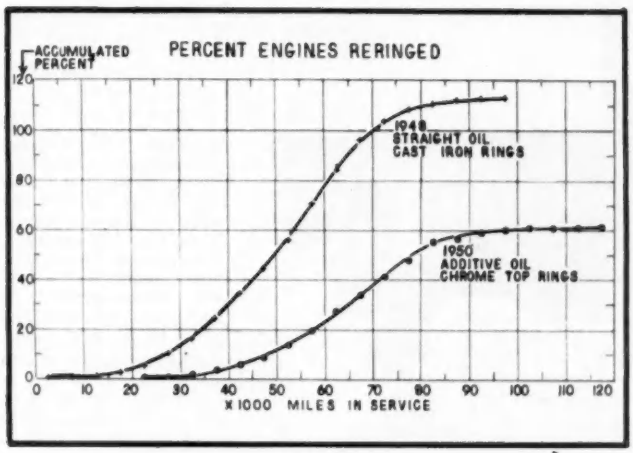



FIG. 2

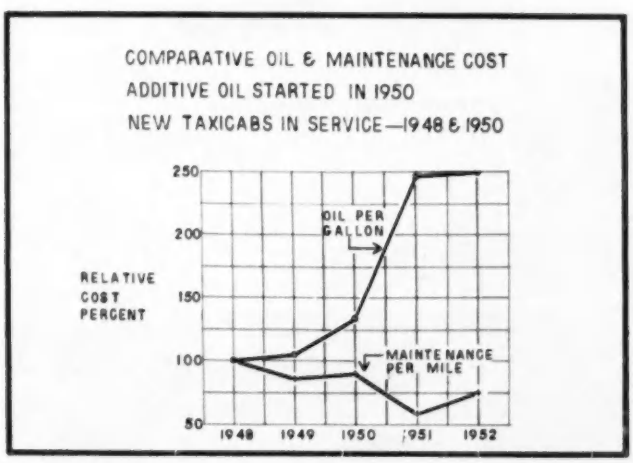



FIG. 3

use of additive oil—in this instance, 58.7 per cent.

The combination of additive oil with hard chrome rings reduces top cylinder wear to a degree where this condition no longer determines engine overhaul.

The amount of sludge formed was considerable, reportedly as great as when a straight mineral oil was used. However, with the additive oil, this sludge was held in suspension. It was removed when oil was drained. In addition, valve chambers were remarkably clean.

Figure 3 shows the reduction in maintenance cost through the use of a modern high additive content oil of Supplement I level to one fleet of 1600 taxicabs. Even though the oil cost per gallon increased 150 per cent, it was insignificant when compared to the saving in labor, material, lost revenue time and improved driver morale.

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*The foregoing article is an abstract of the paper "Engine Lubrication in Taxicab Service" presented by the author at the annual meeting of the American Society of Lubrication Engineers in Cincinnati, Ohio.*

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## Sound Waves Aid Cleaning Of Tubular Valve Lifters

Ultrasonic sound waves are being used to penetrate and clean crevices, blind holes, tube interiors, etc., at Rochester Products Div. of General Motors Corp.

These parts are tubular valve lifters ⅜ in. ID by 12 in. long and open-ended. They are loaded vertically in baskets and pass through a cross rod conveyorized degreaser in the following sequence: chamber of trichlorethylene at 189 F, clean unheated trichlorethylene, and finally a vapor area for drying.

The ultrasonic generator, located directly under the unheated trichlor-ethylene beams high frequency (300,000 per second) sound waves through the liquid bath to reach all surfaces of the parts being cleaned.

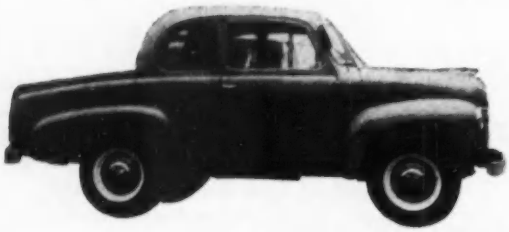
Effective cleaning area is a three-in. circle. The baskets in which the parts are conveyed do not exceed this diameter.

A special indexing timer positions the racks over the generator for from 20-30 sec. Loading and unloading are fully automatic, and the complete cycle from start to finish requires from six to seven min. A basket of cleaned parts is unloaded from the machine every 60-70 sec.

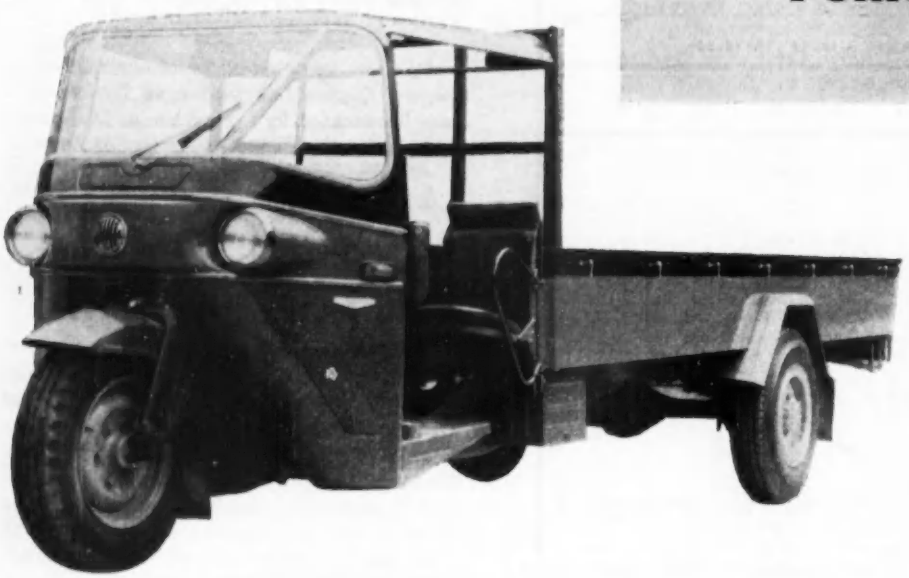
## Ryan Awarded Big Contract For Firebee Target Drones

Ryan Aeronautical Co. has been awarded a $3.5 million contract for an undisclosed quantity of Firebee pilotless jet planes by the Air Force. U. S. Navy and Army Ordnance orders are currently in production at Ryan. The Air Force Firebees will be equipped with the Continental J-69 jet engine.

# Newest Japanese Vehicles



Ohta Kad pickup, powered by a 26 hp, four-stroke, four-cylinder gasoline engine. Piston displacement is 55 cu in. and maximum power is developed at 4000 rpm.

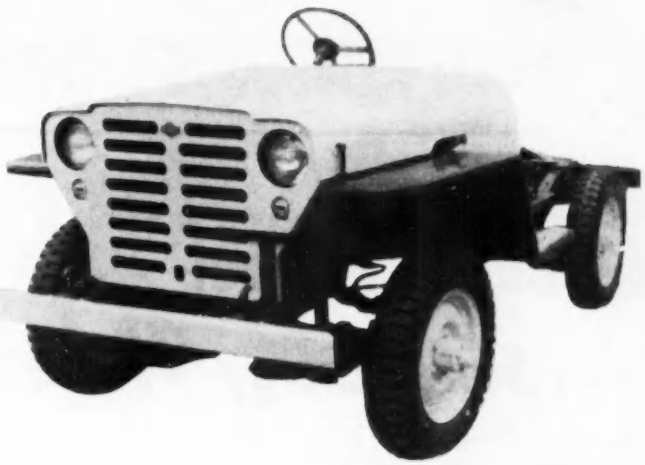


Matsuda Chta Model 102, three-wheeled truck. Overall length of the vehicle is 190 in., width 67 in., and height 72 in. The two-cylinder, aircooled overhead valve engine has a piston displacement of 85.5 cu. in. and develops 38.4 hp at 3500 rpm.

Fuso R21 rear engined bus. Its 522 cu in. water cooled, six-cylinder Diesel develops 130 hp at 2000 rpm. Overall length is 34 ft, 2 in., and wheelbase is 17 ft, 6 in.

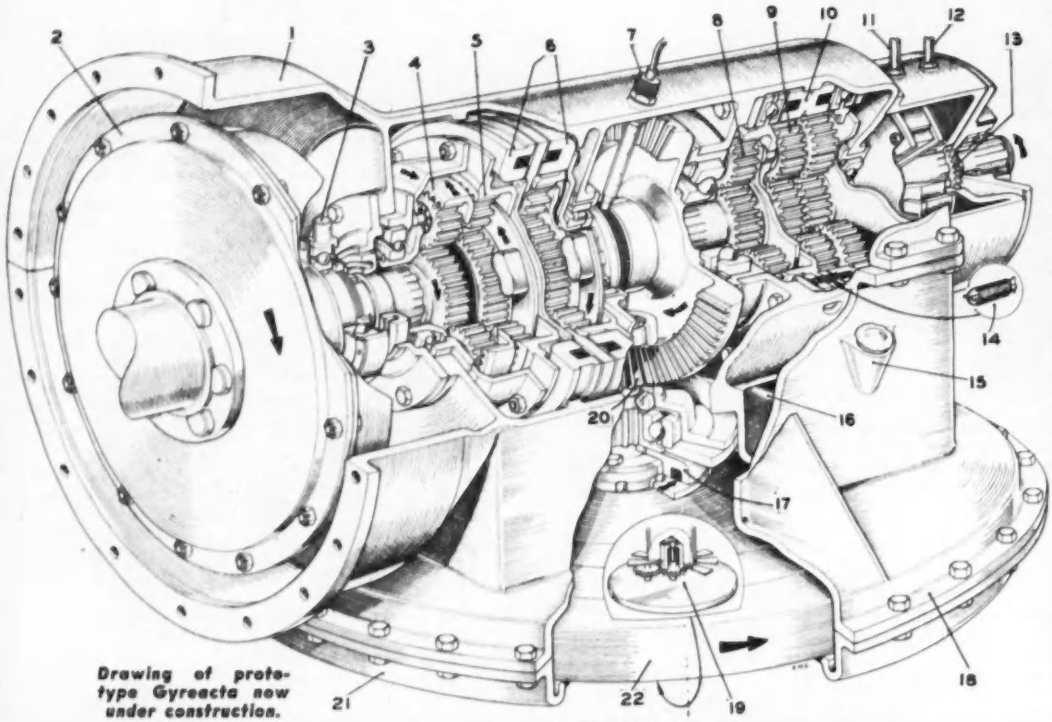
Toyopet RKC nine passenger bus. Wheelbase is 8 ft, 2 in., overall length 14 ft, and height 6 ft, 4 in. Its 88.6 cu in. four-cylinder, four stroke water cooled gasoline engine develops 48 hp at 4000 rpm.

Flying Feather midget car. Its aircooled, four-cylinder, overhead valve engine has a piston displacement of only 21.5 cu in. Maximum output is 12.5 hp at 4500 rpm. Tread at front is 43.5 in. and rear tread is 44 in. Wheelbase is 75 in.



Nissan 4-W-60 patrol car. The six-cylinder, water cooled engine has a piston displacement of 224 cu in. and develops 85 hp at 3400 rpm. Wheelbase is 87 in., height 57 in., width 64 in. and overall length 142 in.


Prince Aish II standard six-passenger sedan. This car has an overhead valve, four-stroke, four-cylinder gasoline engine of 91 cu in. piston displacement. Maximum output is 45 hp at 4000 rpm. Wheelbase is 97 in., front tread 51 in., and rear tread 53 in.




*Drawing of prototype Gyreacta now under construction.*

*(1) bell housing; (2) twin clutch (accelerating and braking); (3) twin clutch release; (4) recuperative braking gear train; (5) accelerating gear train; (6) electromagnetic brakes for third and fourth speeds; (7) brush holder; (8) second-speed train; (9) first-speed train; (10) electromagnetic brake (second); (11) to near-side ram; (12) to off-side ram; (13) oil pump; (14) Clerk tensioner; (15) oil filter and strainer; (16) sump; (17) flywheel electromagnetic isolating clutch; (18) gearbox casing (lower half); (19) flywheel sump scavenger and vacuum two-stage pump; (20) flywheel pinion; (21) flywheel housing (lower half); (22) Gyreacta flywheel. Arrows indicate direction of torque in recuperative braking.*



# Transmission Flywheel *Stores Energy* While Braking

**By David Scott**

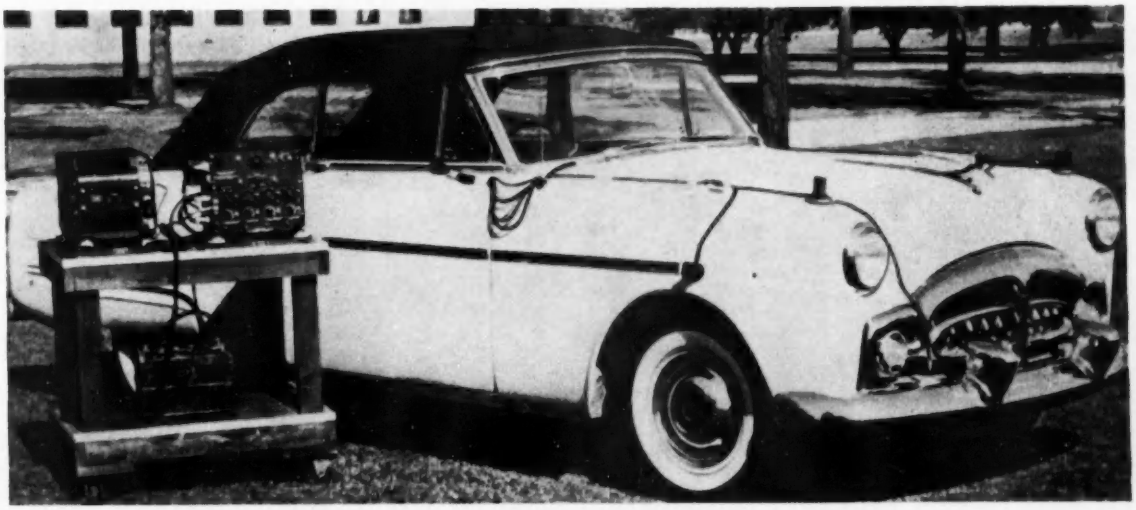
AN epicyclic transmission incorporating a flywheel for storing and using kinetic energy is being developed in Britain by R. C. Clerk, Director of Gyreacta Transmissions Ltd, under the sponsorship of the National Research Development Corp. The flywheel assists the engine during acceleration in the lower gear. In direct drive it is disengaged and runs freely. But during periods of braking it is re-engaged, thus helping to stop the vehicle while also re-energizing itself.

Principal advantages claimed for the Gyreacta are a fuel saving up to 50 per cent on short-stopping vehicles such as local passenger buses; improved performance from smaller engines; elimination of brake-fade and the possibility of using smaller brakes; increased acceleration; and reduced engine wear resulting from the lower governed speed. It is also anticipated that the gyroscopic action of the high-speed horizontal flywheel will add to the stability of the vehicle.

The Gyreacta, weighing 450 lb, includes an accelerating gear train and a recuperative gear train, each with its own disk clutch, a four-speed transmission, and a 205 lb, 24 in. diam flywheel normally running at about 15,000 rpm in a near vacuum. Ratios of the epicyclic transmission are automatically selected by electromagnetic clutches connecting with a bevel drive from the vertical flywheel spindle.

Normal sequence of operation is described as follows: When the engine is first started up the second (recuperative) clutch is engaged and the flywheel is automatically brought to a speed of 15,000 rpm. Once at full speed, and the clutch disengaged, the flywheel is said to remain in motion for seven to 10 days even

(*Turn to page* 109, *please*)



*Vibration pickups, a 4-channel amplifier, and a recording oscillograph were used to track down the cause of fender shaking in a proposed design. During road tests, all instruments were installed in car.*

# *ANALYZING* FENDER VIBRATION

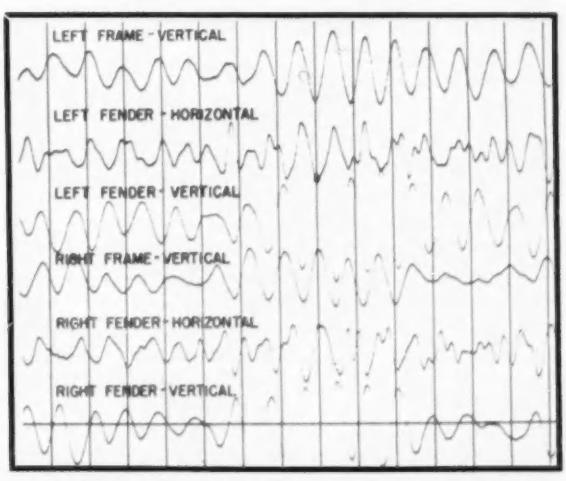
WHILE testing a proposed model, engineers at Packard Motor Car Company's Utica, Mich., proving grounds, discovered a pronounced vertical shaking of the front fenders, which was introduced by driving over moderately rough macadam roads. Especially noticeable since the Packard fenders are hood height and readily visible to the passengers, the shake was definitely too severe to be acceptable in models destined for production.

Investigating to find the cause, Packard's body engineers attached a Consolidated Engineering Type 4-102 velocity pickup system to the front fenders and frame rails, and to the upper suspension control arms. A convertible was used, since shaking was most pronounced on that body style. Pickup output fed an amplifier system "D," linked to a Type 5-114 recording oscillograph.

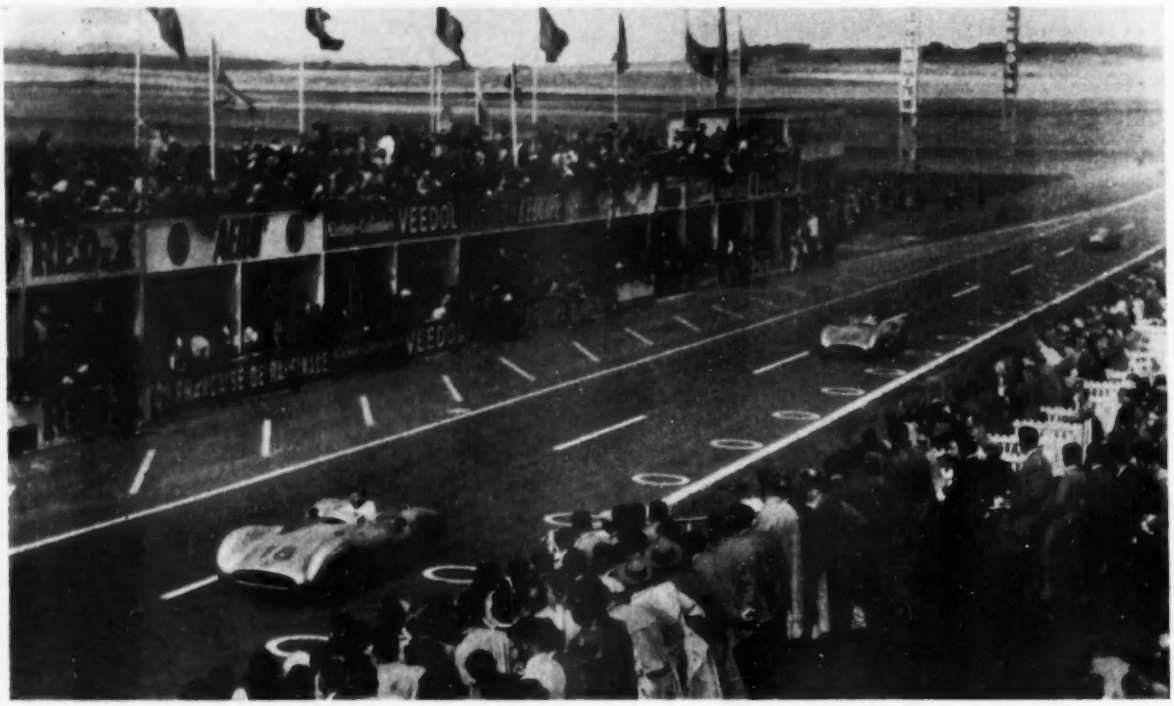
With Type 7-217 galvanometers installed in the oscillograph and record speed set at 5 in./sec, the test car was again driven over the test course to create the shaking condition, and a dynamic record was obtained of amplitude, frequency and direction of the fender, frame rail and control arm movement.

Close study of recorded data indicated that the fender shaking was actually induced by frame twisting, caused in turn by the front wheels "hopping" at 180 deg out-of-phase. At no other time did the shaking conditions appear. Once the cause had been located, several methods of eliminating the difficulty were considered, including stiffening the front frame rails from the dash forward, and a center-of-rotation mounting to isolate the front-end sheet-metal assembly from the effects of frame twist. Road and torsion-rig tests proved these ideas impractical for this particular application. A decision was then made to improve frame structural strength by stiffening the sheet-metal assembly so that it would provide sufficient

(*Turn to page* 112, *please*)




*Typical record taken during road tests. It established for the design engineers an exact picture of amplitude, frequency, and direction of vibration vs. time.*




# New Mercedes Dominates at

**By W. F. Bradley**
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

RHEIMS, FRANCE

MERCEDES-BENZ return to racing was marked by so much success that before half distance had been covered in the French Grand Prix, at Rheims, July 4, all competition had been killed off and orders were given to the drivers to slow down. Fangio and Kling came in winners at an average of 115.9 mph. Manzon finished third in a Ferrari, Prince Bira and Villoresi were fourth and fifth with Maseratis, and Behra came in sixth in a Gordini. Of 23 starters, these were the only cars to stand up to the terrific pace set by the German racers. A lap record at 121.4 mph was set up during the race by Hermann in one of the Mercedes, before he was forced out with a broken oil pipe, but in practice Fangio lapped the track at 125 mph.

This year Europe is racing under the new international rule limiting piston displacement to 152.5 cu in., without supercharger, but with no restrictions on weight or fuel. In most cases makers have adapted existing designs to the new piston displacement rule, but Mercedes-Benz, having no special racing cars, started out with a clean slate and produced some remarkable cars which may be unbeaten for a long time.

The new Mercedes has a straight eight engine of 3 by 2.7 in. bore and stroke, which brings it just within the displacement limit. It is mounted with a considerable inclination to the right, being only 20 deg above the horizontal. Cylinders are an iron casting, but other engine parts are light alloy. An outstanding feature is the use of direct injection into the combustion chamber by a Bosch injector unit said to maintain a pressure of 2130 psi. The injector is driven off the center of the camshaft and by reason of the inclination of the engine is practically vertical in the center of that unit. Air is taken in at the front, through the oval grille and is led to the inlet ports through an eight branch intake manifold. Ignition is by Bosch magneto, with two plugs per cylinder. It is

claimed that the use of direct injection allows the engine to hold its power up to better than 8000 rpm. Output is said to be 250 hp.

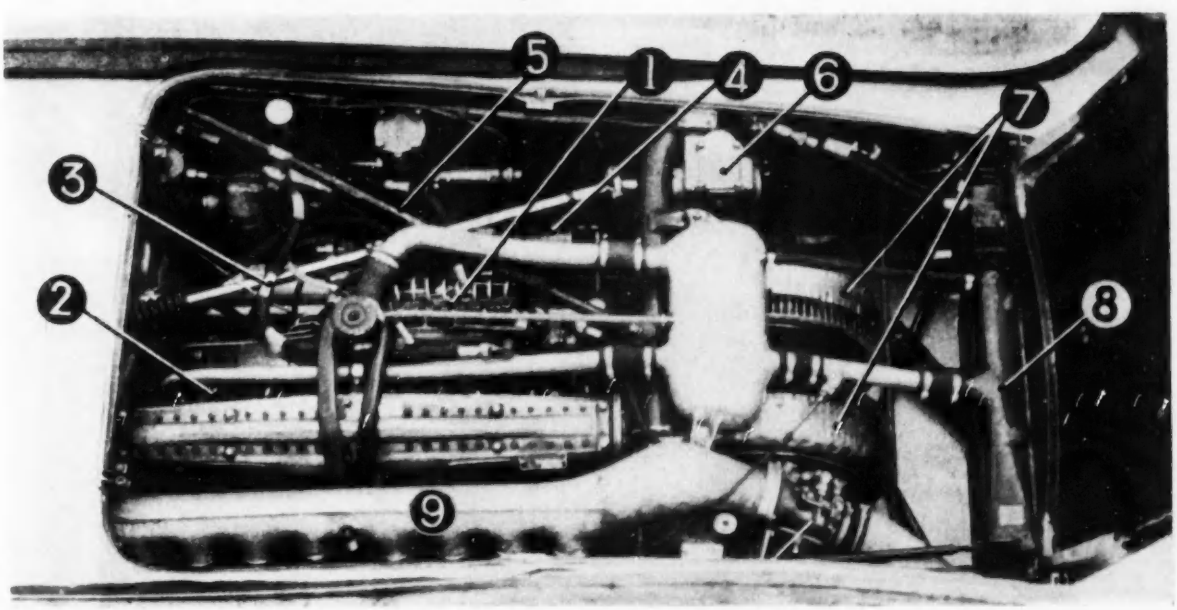
Apart from direct fuel injection and an almost horizontal engine, other Mercedes features are a tubular chassis frame, inboard brakes front and rear, and a combined differential and five-speed gearbox. The chassis frame is built up of small diameter steel tubes, with larger diameter tubes for the cross members. At the front, short and long support arms are used, with fore and aft torsion bar suspension. The rear also has independent suspension, with the wheels carried on centrally pivoted forged steel swing arms of large section. Rear springing is provided by torsion bars. The light alloy differential housing and five-speed gearbox form one unit and have pressure lubrication. The two brakes, with light alloy drums, are completely inboard.

(*Turn to page* 80, *please*)


***Juan Manuel Fangio in the winning Mercedes. Other photo shows the No. 18 Mercedes and two other cars during the race. Wide World photo.***

# French GRAND PRIX

***Below is top view of Mercedes power plant. 1—injection pump, 2—one of the injectors, 3—fuel line, 4—magneto, 5—diagonally-mounted steering shaft, 6—steering gear housing, 7—inboard front brakes, 8—top of radiator, 9—intake manifold with throttle at front end.***

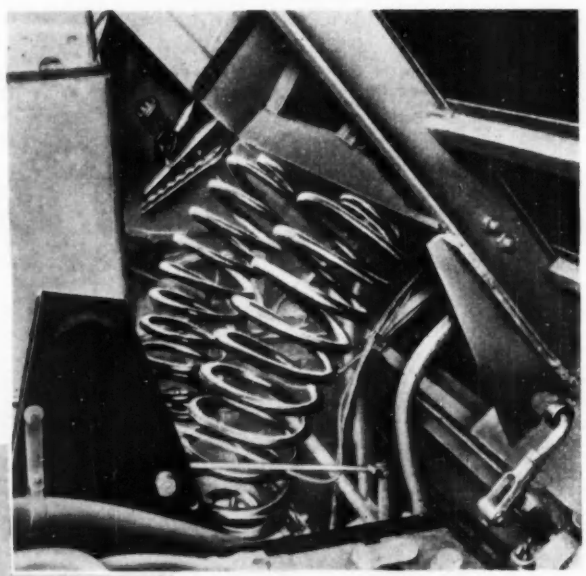


# IHC Balanced Tilting Cab

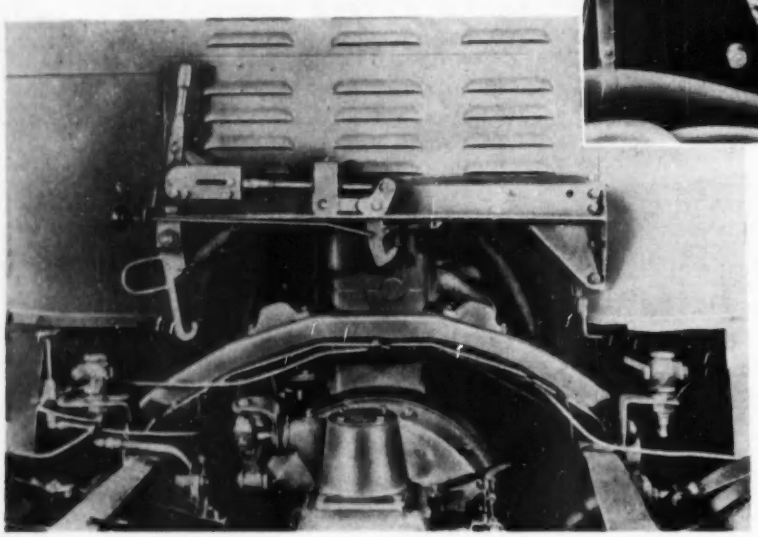
THE entire cab of International Harvester Company's new heavy-duty, cab-over-engine motor trucks, recently introduced in 12 models, tilts forward to expose the powerplant and cooling system for inspection, adjustment, routine maintenance and repair. These new models were announced in AI, July 15, page 18.

To expedite cab raising, compartment doors are opened, increasing weight on front end. With release of three safety locks, it is claimed that one man can raise cab forward in minimum of time by using only one hand. A special safety device keeps cab tilted at approximately 40 deg while service functions are underway.

*With doors opened to increase weight on front end, entire cab assembly tilts forward.*



*The cab automatically locks down and is secured by an externally-controlled, triple-lock safety latch. Three locking devices must be released to disengage the cab from the chassis.*



*Two large coiled springs are located beneath the cab where they counterbalance the assembly.*

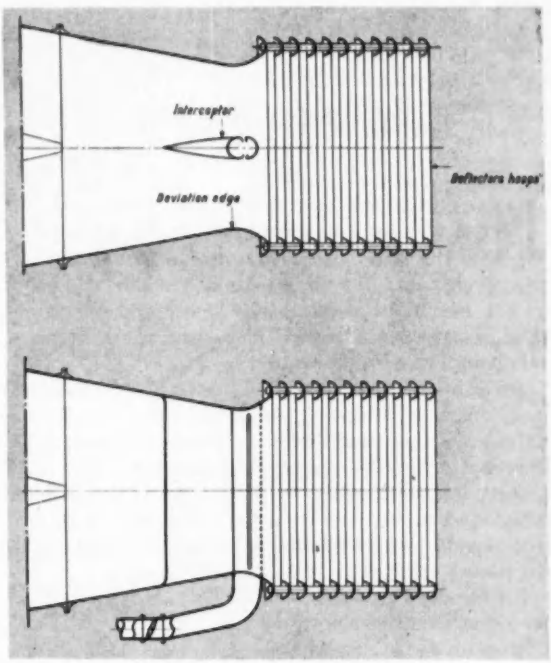
# System of *JET DEVIATION* developed in France

After experiments and tests extending over several years, SNECMA (French National Aviation Engine Co.) has developed a system of jet deviation and has sold manufacturing rights in the United States.

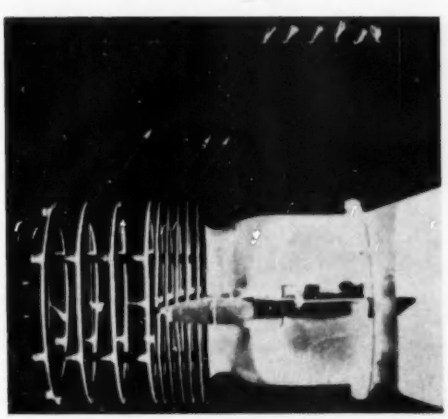
Most of the flight tests were carried out on Vampire planes with Gobelin jet engines, for the reason that these are in general use in the French air force. This aircraft having a single jet engine and twin booms, the jet had to be deviated into two symmetrical streams which would have no reaction on flight characteristics. It is stated, however, that the deviator has been applied to such different types as Turbomeca Piment, jet diameter 4.7 in.; B.M.W. 003, jet diameter 14.2 in.; Rolls Royce and Hispano-Suiza Nene, jet diameter 18.8 in.; and SNECMA Atar, jet diameter 22 in.

Practical results are an important reduction in the distance necessary to bring the plane to a standstill. In the case of the Vampire-Gobelin this distance is from 2620 to 3280 ft and can be reduced to 1300 or 1600 ft with the use of the deviator. These results are obtained with the same use of wheel brakes in each case. On ice-coated fields, where wheel brakes lose their efficiency, the retarding effect of the jet deviator is unimpaired. There are advantages also in ground approach, the jet deviator making it possible to descend at angles three to four times greater than the maximum normal.

The type of deviator adopted by SNECMA consists of deflector hoops. It gives a possible counter pressure of 20 per cent, a loss in direct operation of two per cent, and an increase in weight of five to six per cent. On the Vampire tests the counter pressure used was 12 to 15 per cent. The deviator has been used on the Atar jet with afterburner, having a thrust of 6600 lb, the counter thrust being 20 per cent. Deviation has been carried out much beyond the 20 per cent figure, but a disadvantage is that as the counter pressure increases the angle decreases, with danger of interfering with the various elements of the plane. It is therefore considered that 20 per cent is the most satisfactory figure. It is claimed that on a plane specially designed to receive this thrust reverser some weight could be saved.




*Elevation and plan of the SNECMA jet deviator designed for Gobelin gas turbine.*



*At near right, tufts, hanging on line above deviator, show reverse flow of gas*

*At far right, deviated flow of gas is made visible by means of white powder*

# Manifold Production With Latest Automation Equipment

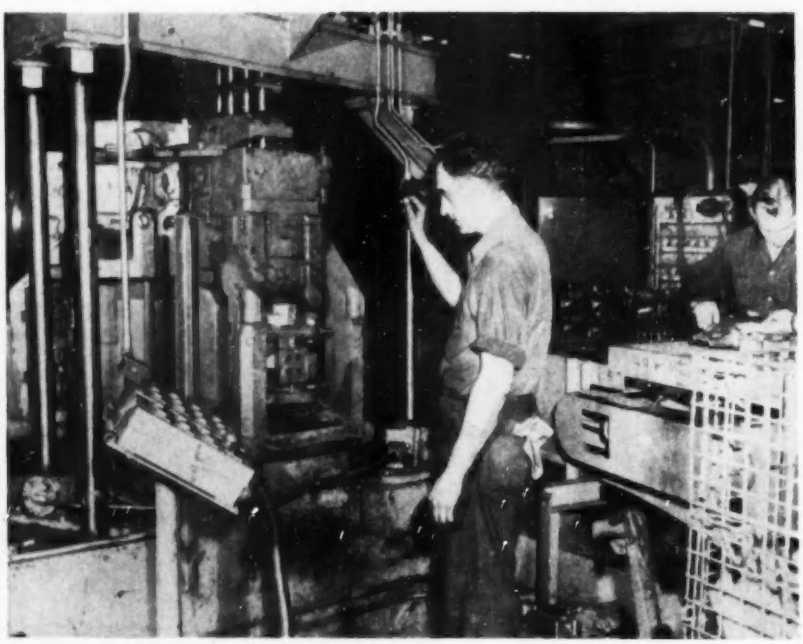
## By Thomas Mac New

INTAKE and exhaust manifolds are produced at the Ford Cleveland Engine Plant over lines equipped with the latest in transfer machines and automation equipment. Before manifold castings are placed on the machine line for material removal operations, they are given a thorough inspection with the necessary qualifying equipment.

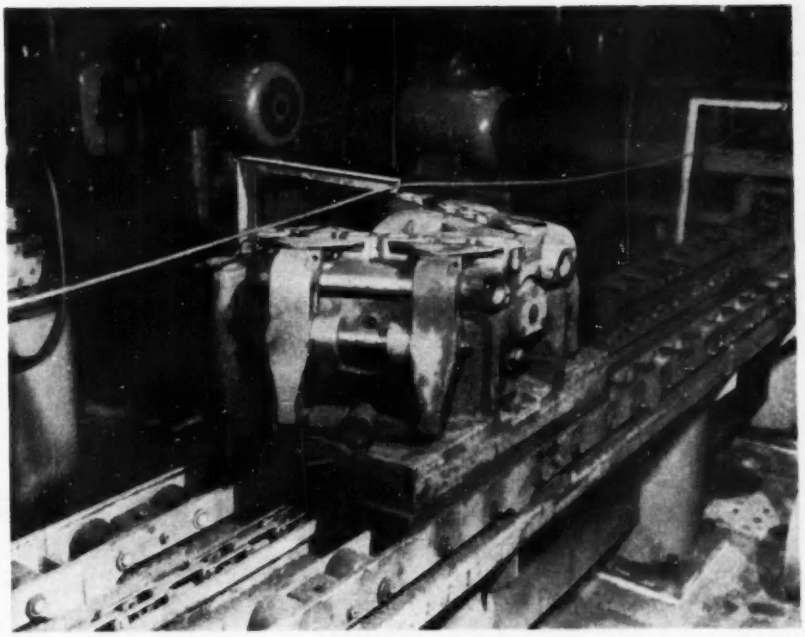
After being approved in the as-cast state, the intake manifold is conveyed to a Newton rotary type index milling machine equipped with three stations. At the first station in this rotary type machine, the rough casting is loaded into a special fixture with the water outlet pad of the manifold up. The casting is positioned both vertically and laterally by spring-loaded equalizing plungers which are mechanically released. Material removal operations performed at the second station of the Newton machine include milling the heater connection and carburetor pads with the vertical head of the rotary mill. The horizontal head is used to mill the mounting flange on one side only. A nine-inch cutter with 30 tungsten carbide tipped blades is used on the vertical head, and a seven-inch milling cutter using 24 tungsten carbide tipped blades works off the horizontal head. The third station of the machine uses a horizontal head for milling the other side of the manifold mounting flange. A gage is included in the machine for checking the parallelism of the mounting flange for the right- and left-hand banks. After being indexed around to station 1, the milled intake manifold is unloaded.

For the next operation along the line, a 12-station Cross transfer machine equipped with a special platen is utilized. This unit mills the water outlet pad and drills, countersinks, and taps all holes in the carburetor pad and vacuum hole, as well as drilling all holes in the intake manifold mounting flanges. The machine is equipped with an oscillating type chip conveyor and a dust control system for healthful working conditions. One fixture is utilized throughout the entire machining operation. As along the head and block lines, machining speeds and feeds are those commonly used for cast iron.

In the next machining phase, another Cross automatic transfer machine is brought to play. This unit is a special five-station dial type machine used for core drilling the venturi holes, drilling, countersinking and tapping holes in the carburetor pad, ignition coil and accelerator bracket bosses.



*The first machining operation on the Mercury intake manifold is done on a Newton rotary mill having vertical and horizontal heads for milling required surfaces.*

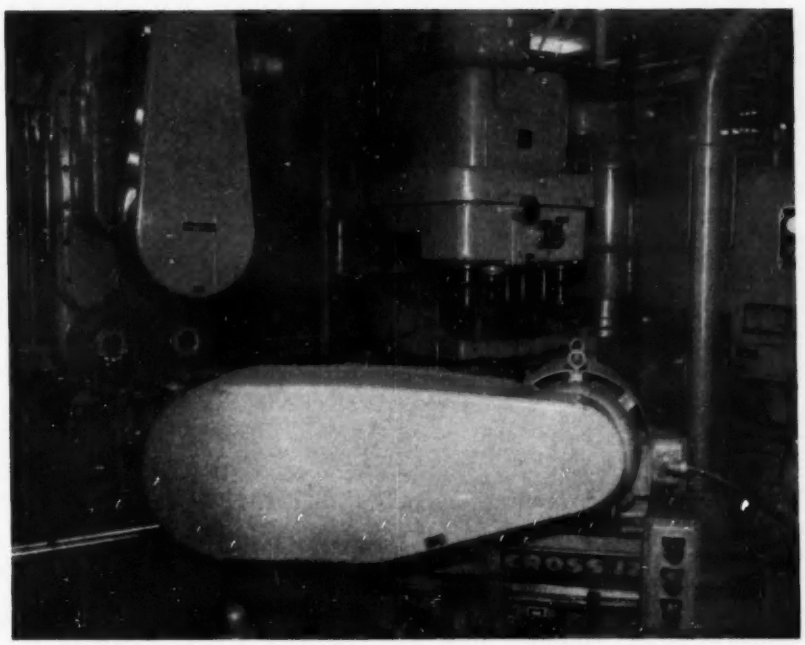


*Right and left-hand exhaust manifolds are secured in the type of fixture illustrated for all machining operations.*

The part is located in the machining fixture from the mounting holes and is fed into the machine with the water outlet pad leading.

Following this operation, the workpiece is deburred with air driven grinding equipment and then washed. Next, the part is air tested for porosity in a special five station machine. The heating chamber is tested at the second station of the machine and the intake chambers are tested at the two succeeding stations. The first and fifth stations are for load and unload respectively. Manifolds are conveyed to and from the test equipment as well as through the machine without manual handling. All intake manifolds passing this rigid test are then given a final inspection with a vairety of gages.

Some of the final tests are for gaging the height and location of all the pads and the relation of all holes, parallelism of mounting flanges of the right- and left-hand bank, and depth of threads in the water outlet and ignition coil pads. Other tests include checking depth of threads, diameter of holes, contour of mounting face and relation of port openings with mounting holes, and contour and relation of holes in the water outlet pad.

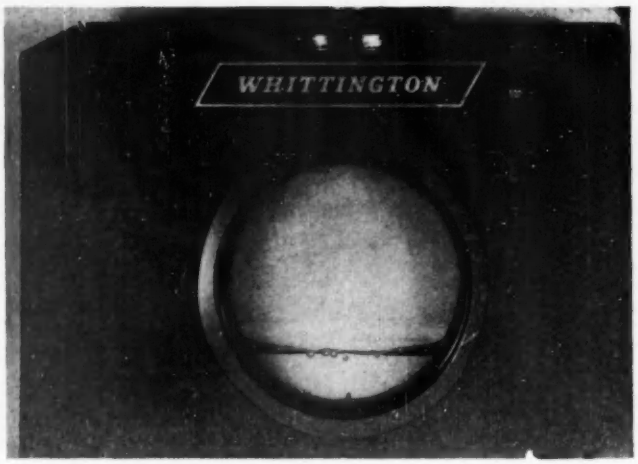


*Exhaust manifolds, moving from right to left, are completely machined in this 10-station Cross transfer unit.*

Exhaust manifolds, after being properly qualified, are loaded into a Cross 10-station Transfer-matic. The entire machining necessary for the completion of the manifolds is performed on this 41 - spindle machine. Work - holding fixtures, of the type illustrated, hold a left- and right-hand exhaust manifold side-by-side. The mounting flanges of the manifolds are in an upright position. As the fixture proceeds through the machine, the manifolds are machined simultaneously. The machining fixture is secured to a chain which propels it through the transfer machine on roller equipped tracks. Fifteen of these fixtures are used on each of the machines utilized for this operation.

(*Turn to page* 124, *please*)

# NEW Developments in Vacuum Testing




*Bubbler which provides visual means of leak determination*

BY LORANCE STERNS, CHIEF ENGINEER, WHITTINGTON PUMP & ENGINEERING CORP.

THE uses of vacuum as a tool in industrial processes and as a testing medium are developing rapidly. Vacuum testing is now being used to do a better and faster job than has been done with conventional methods. Although vacuum is not a cure-all for many problems, it is well to consider the use for this versatile tool where practical.

A most recent development in the field of testing is a "bubbler" which provides a visual means of leak determination. This is an instrument in which the actual leak or lack of leak is observed without the usual "dunking" of the part being tested. A glass cell is carefully constructed and incorporated into a vacuum system. The cell is built into the system in such a manner that air from a part on test is evacuated through it. A tube from the part terminates in the bottom of the cell, in which a small amount of fluid is trapped. A diffused light back of the cell makes very small bubbles easily discernible. Air evacuated from a part on test flows through the bubbler but the bubbles rapidly decline in amount and cease if the part does not leak; or if the part leaks, the bubbles continue approximately at the same rate as the leak in the part. The size and volume of bubbles indicating a leaky part are larger than the actual leak because of the vacuum drawn on the system. The air volume passing through the bubbler will be double the actual volume of air entering the leak in a part on test if vacuum on the system is 15 in. of mercury, at 24 in. mercury the volume of the leak into the part will be increased five times at the bubbler, at 27 in., 10 times, etc.

Advantages of this method of testing are—elimination of wetting the part either inside or outside; simple tooling; safety—vacuum is not dangerous to the operator; speed—very favorable time can be realized; positive indication—part either leaks or it does not and the amount of leak can be exaggerated at higher vacuums. The ability to see leak in the easily observed bubbler is of prime importance and cannot be stressed too greatly.

The average small part to be tested is placed on a rubber pad and other seals applied, if required. The operator observes the bubbler. If the quantity and size of bubbles diminish and stop, the part is tight. If the bubbles do not stop, then the part leaks. The operator may place a part on test with one hand while using the other hand to bring up a new part and can be quite efficient.

Another recent application of vacuum is the use of it as a measurement method. Special gages have been developed for measurement of the angle on automotive engine valve seats. This is a difficult measurement to make with conventional tools but with vacuum gages it is comparatively simple and the results are surprising in sensitivity. Several measurement problems are being studied — a few are being explored experimentally to determine their practicability. These new

(*Turn to page* 106, *please*)

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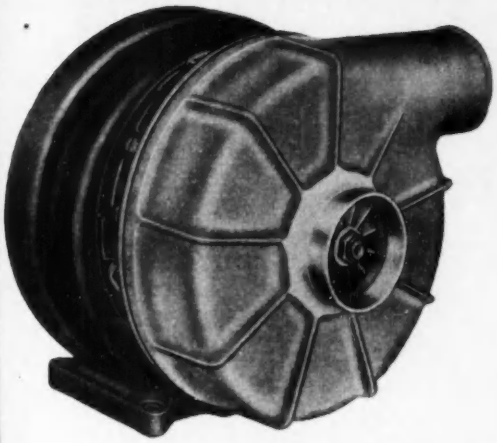

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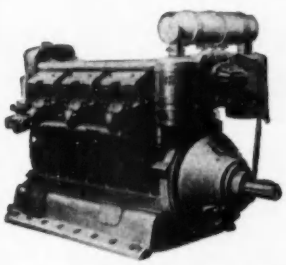
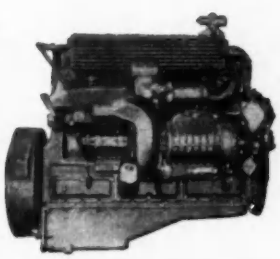


Model D-375—Caterpillar Diesel V8



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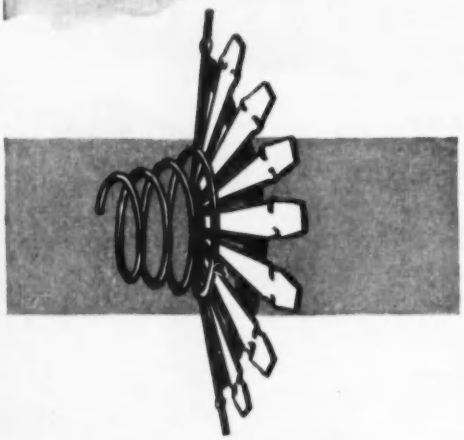
Hand of Steel in a Velvet Glove

# LIPE MULTI-LEVER CLUTCH



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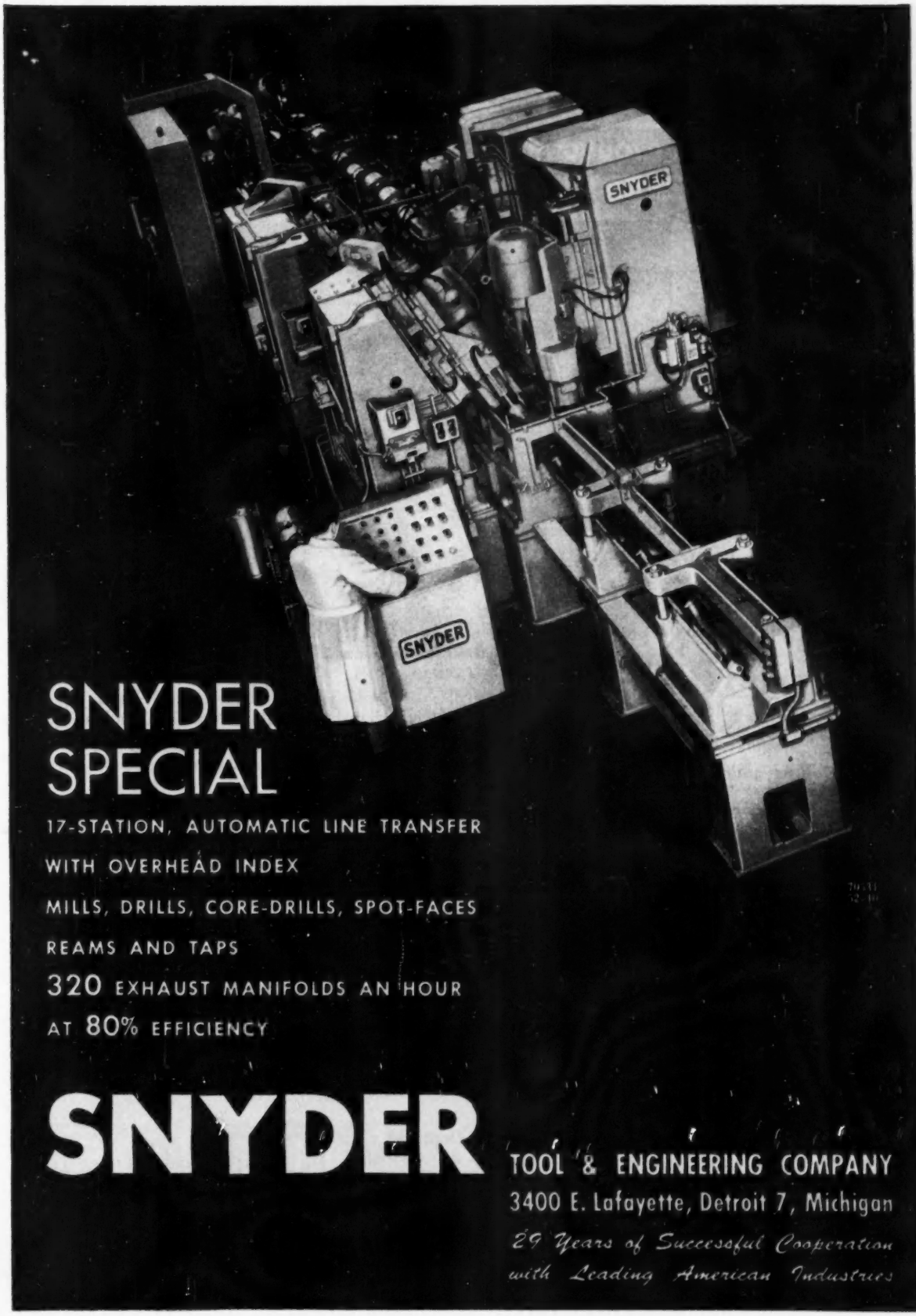
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17-STATION, AUTOMATIC LINE TRANSFER
WITH OVERHEAD INDEX
MILLS, DRILLS, CORE-DRILLS, SPOT-FACES
REAMS AND TAPS
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AT 80% EFFICIENCY
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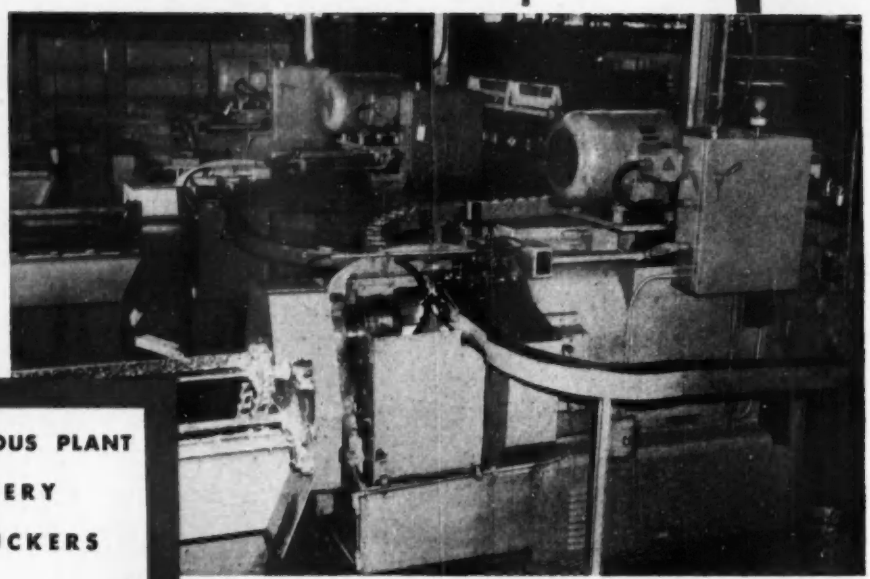
TOOL & ENGINEERING COMPANY
3400 E. Lafayette, Detroit 7, Michigan
29 Years of Successful Cooperation
with Leading American Industries

. . . IF IT'S A HIGH PRODUCTION PROBLEM . . .

ASK BAIRD ABOUT IT



ANOTHER WORLD-FAMOUS PLANT
INSTALLS BATTERY
OF BAIRD CHUCKERS

The photo above shows four of a battery of eight Baird 6-spindle automatic Chucking Machines performing the complete turning operations on aluminum alloy pistons . . . including automatic feed and discharge.

The Plant Manager says, "Previous methods of finish-turning required *four* separate operations. Now, the same results are attained in one operation . . . faster and with less chance of error." Cutting speed is 1332 to 1350 ft. per minute . . . feed per revolution .018 to .025. Actual cutting time at each station approximately 5 seconds . . . complete cycle 7.36 seconds.

Baird Chuckers are designed and built to insure positive, continuous, production . . . tooled for precision at low unit costs that give you a definite, competitive advantage.

As automation of large plants advances, Baird automatics can play a vitally important part in your production lines. And Baird engineers, highly experienced in special tooling techniques, offer you solutions for tough production problems. It will pay well to "ask Baird about it."

Write to Dept. AI

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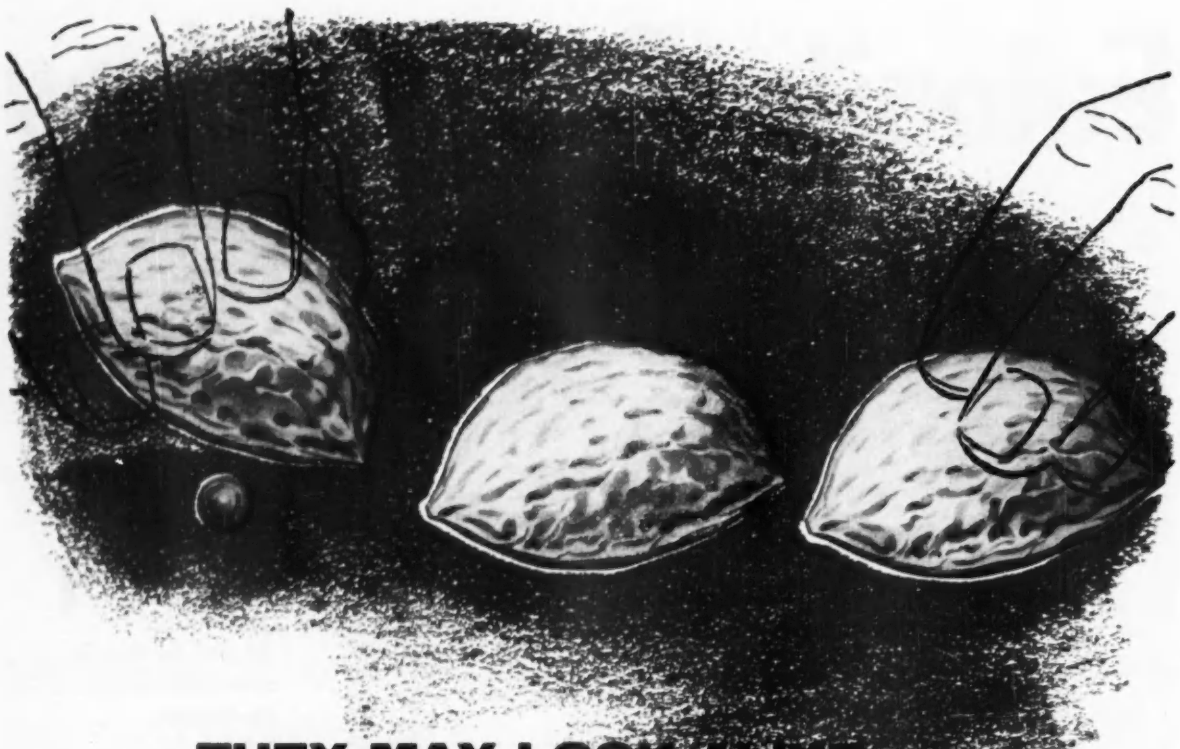

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## ...but there's a big difference underneath

And it's the same way in buying carbon or alloy steel tubing. Lots of it looks very much like OSTUCO . . . but underneath it all there are these advantages that save you money:

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# News of the MACHINERY INDUSTRIES

*By Thomas Mac New*

**Outstanding Results Obtained on Bar Automatics by Right Combination of Machine, Carbide Tooling and Coolant**

## For Real High Production— Automatics Tooled with Carbides

The products of three companies were combined recently in a joint effort to establish a better production tool. Result of the program is automatic bar machines capable of extremely high production rates.

Cone, the bar machine maker, in addition to making many improvements in its bar machines, has equipped the units with Carboloy 300 series carbides and utilized Houghton coolants. According to Cone, the package has proved so successful that the production combination is far ahead of any automation device suitable for keeping it supplied with raw material.

Recently, in Windsor, Vt., Cone Automatic and Carboloy Department of G. E., who have been working jointly on the program for some five months now, held a demonstration of three machines. As most multiple spindle setups are individualized, it was agreed to seek for development actual jobs that made use of the commonly known tools, and at the same time were representative of volume production by bar machines.

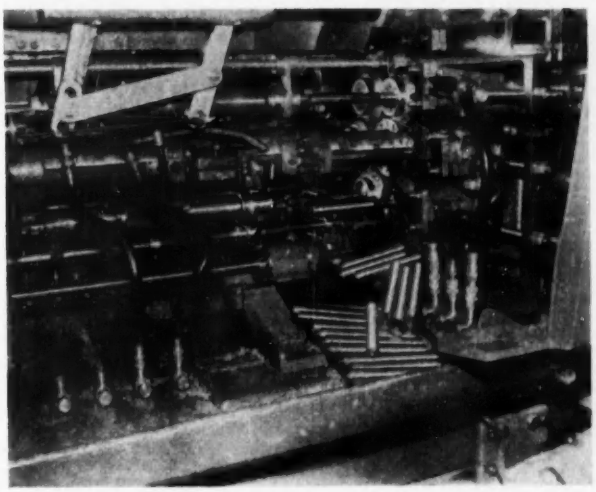
One machine was tooled up to make use of end and side tools that are familiar to all users of automatics. Another was set up to handle 52100 steel tubing in the production of ball bearing inner races. And a third machine was set up to handle the type of threading that can be accomplished with carbide tipped die head chasers.

For the threading job, a 7¾ in. long leveling screw made from one inch diam SAE B1112 screw stock, a 1⅝ in. six-spindle 50 hp automatic was tooled with grade 370 carbide. In production, the machine produces the screws at the rate of two every seven seconds, or 994 per hour; whereas, previous production ran at 140 pieces per hour. Houghton's all-purpose coolant is used for the operation. The machine generates a direct spindle speed of 958 rpm and a die speed of 628 rpm—providing a total effective speed of 1586 rpm for threading. Actual thread cutting time is three seconds.

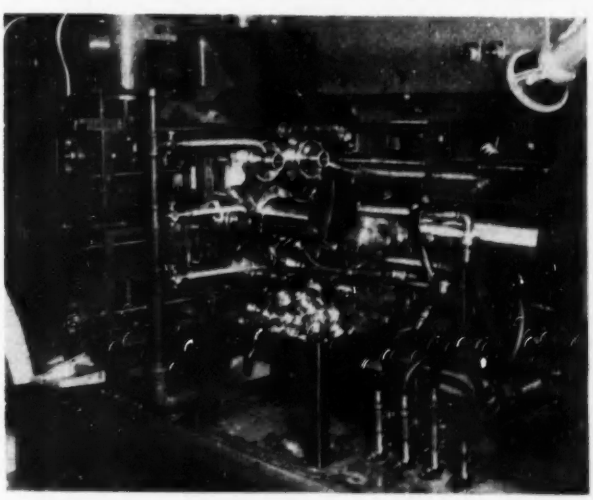
In tooling up the second machine—a 50-hp, 2⅝ in., six-spindle automatic—with grade 370 carbide, Cone engineers produced standard inner bearing races at the rate of one every 10.3 sec. or 349 pieces per hour. This part is made from 2.282 in. OD SAE 52100 steel tubing using seven carbide cutting tools. The work is run at a speed of 519 rpm or about 313 sfpm. Feeds are from 0.003 ipr to 0.012 ipr on the cross slide with a 0.010 ipr feed on the tool slide.

Production of centers for oil shutoff valves was increased almost six-fold with carbide tooling on another 50-hp automatic. These parts were produced at the rate of one every eight seconds on the six-spindle machine. Carboloy grade 78B carbide is used for turning tools, and grade 370 for breakdown forming, form taper, finish groove, shave and cutoff. The workpiece is machined from one-inch hexagon SAE B1112 stock. Feeds range from 0.0017 ipr to 0.0061 ipr, and the spindle speed is 1562 rpm.

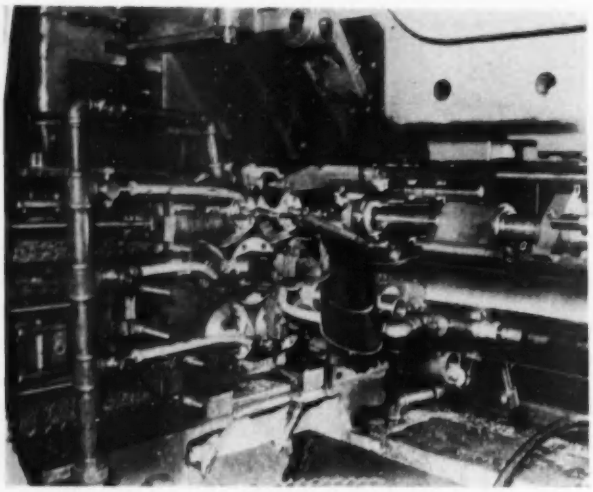
According to the engineers working on the program,



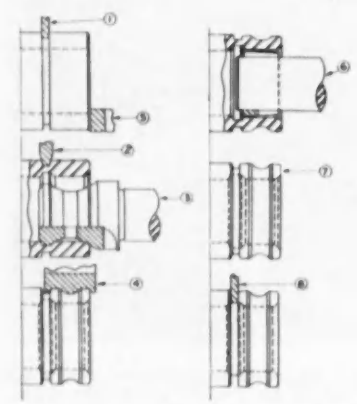
***Two 7¾-in. leveling screws for machine tools are produced every seven seconds on this 50-hp, 1⅝-in., six-spindle Cone automatic tooled up with Carboloy grade 370 carbide. The work is produced from one-in. SAE B1112 steel stock.***



***One standard inner bearing race drops through the chute of this 50-hp, 2⅝-in., six-spindle Cone automatic machine every 10.3 seconds.***



***Producing a center of an oil shutoff valve on this 50-hp, 1½-in., six-spindle Cone automatic is an eight-second job. Machine is tooled up with Carboloy grade 370 and 788 cemented carbides.***



***Spindle and tooling setup for six-spindle Cone automatic. Cross hatching indicates Carboloy grade 370 carbide tipped cutting tools at each of the spindle positions; 1—breakdown blade; 5—form type butt face; 2—form vertical; 3—internal recess; 4—form; 6—auxiliary spindle, ream; 7—left open for marking face; 8—cutoff.***

coolants play an important role in all three operations. It was found that by sealing off bearing and spindles of the automatics, water soluble coolants did an effective job of cooling both the machine and cutting tools when machine speeds were increased 10 times.

The joint engineering venture points out the following facts concerning the program:

1. Multiple tool setups of automatic machines are not barriers to cemented carbides.

2. Tool holders, as well as auxiliary attachments should be engineered to meet job conditions.

3. Proper selection of carbide grades and correct tool geometry are more important in applying carbides to automatics than to most other machines.

4. Adequate horsepower to the work spindles is essential.

5. A good method of supplying a generous amount of water-based coolant to the cutting areas is a must.

## Machine Tool Business Dips Slightly in Month

There is still much optimism in the machine tool industry about business in the future despite a continued decline in orders during the past few months. With the Government almost completely out of the picture, tool builders are looking forward to the highest level of civilian business they've ever had.

Machine tool orders slipped from $42 million in April to $41.3 million in May, a very slight decrease when compared with the heavy monthly drops in the early part of the year. May shipments, however, fell 10 per cent under the preceding month's total, while monthly backlogs dipped to 3.8 at the end of May compared with 7.7 at the same time last year.

## Gearing Slips

According to the American Gear Manufacturers Association, the volume for the gearing industry decreased by 15 per cent in May as compared with April. The figure for May is 134.3 per cent (1947-49=100).

## Mercedes Race Cars

*(Continued from page 67)*

The position of the engine causes the two-piece driveshaft to be placed off center. The steering gear also is diagonal. The body is light alloy, with integral fenders. Wheels are 16 in. wire spoke type, with central lock ring and light alloy rims. Just ahead of the center line of the rear fenders there is an air slot, directing a current of air to the rear tires. This air is discharged at the rear of the fender.

Gasoline capacity is 53 American gallons, the mixture used in the Grand Prix race being straight gasoline and alcohol. The cars ran the distance of 310 miles without refueling. Weight empty is stated to be 1540 lb, but this could not be checked, for there was no obligation to put the cars on the scales. Brakes are hydraulically actuated and incorporate a new servo mechanism developed by the Bosch Co.

Three British Jaguars took the first three places in the 12-hour Rheims international sports car race.

Peter Whitehead and Ken Wharton drove the winning new competition model Jaguar over the five-mile closed-circuit course at an average over-all speed of 104.5 mph. Second in a new type Jaguar were Tony Rolt and Duncan Hamilton. Roger Laurent and Jacques Swaters, also driving a Jaguar, took third place. Masten Gregory, of Kansas City, and Clemente Biondetti drove a 4.5-liter Ferrari to fourth place. Briggs Cunningham of Greens Farm, Conn., and Sherwood Johnston, Rye, N. Y., drove a Cunningham to fifth place.

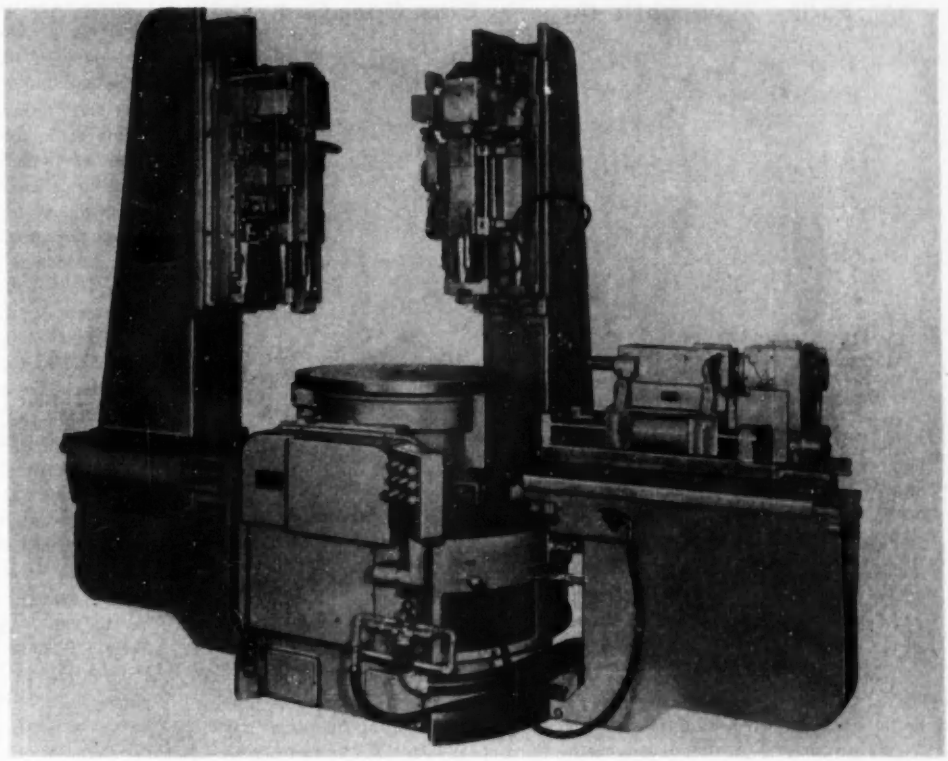
### *New Source Tapped For Iron Ore*

Ford Motor Co. has announced that Humboldt Mining Co. has started production of experimental iron ore concentrate from low grade deposits in Michigan's Upper Peninsula. Development of a process for making use of the plentiful low grade ore is significant, according to Ford, because high grade deposits in Michigan, Minnesota, and Wisconsin are being depleted rapidly.

The mining company, whose operations are located near Ishpeming, Mich., is owned jointly by Ford and Cleveland-Cliffs Iron Co. The concentrate, Ford points out, is far higher in iron content than the Lake Superior "direct shipping" ores on which steel makers depend largely.

# NEW EQUIPMENT PLANT • PRODUCTION

*FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89*



*Flexible universal drilling machine with which the user can create his own single purpose machines.*

## Standard Automatic Drilling Machine for Special Setups

A universal drilling machine which enables the user to create his own single purpose machine is now on the market. Designed to provide a standardized basic machine accurate enough for aircraft parts and rigid enough to hold tolerances in heavy work, the fully automatic machine accommodates up to four drilling or tapping units, all of which are quickly adjustable radially, vertically and circumferentially. Changeable cams for programming control allow quick conversion to meet engineering changes.

Its air-hydraulic heads will drill up to ¾ in. holes in mild steel, ½ in. in stainless steel, with interchangeable index plates for equal or unequal hole patterns. Spindle speeds range from 180 to 6700 rpm; feed ranges from ½ to 40 in. per minute. It is quickly adjustable for all factors of standard 96 notch or other index plates or for intermittent or irregular spacing. Special index set-ups available allow up to 192 indexes. Capacity ranges from 87 in. diam work with 65 in. bolt circle diameter down to 30 in. diam work with eight-in. diam bolt circle. *Hartford Special Machinery Co.*

**Circle 56 on postcard for more data**

## Multichannel Oscillographs

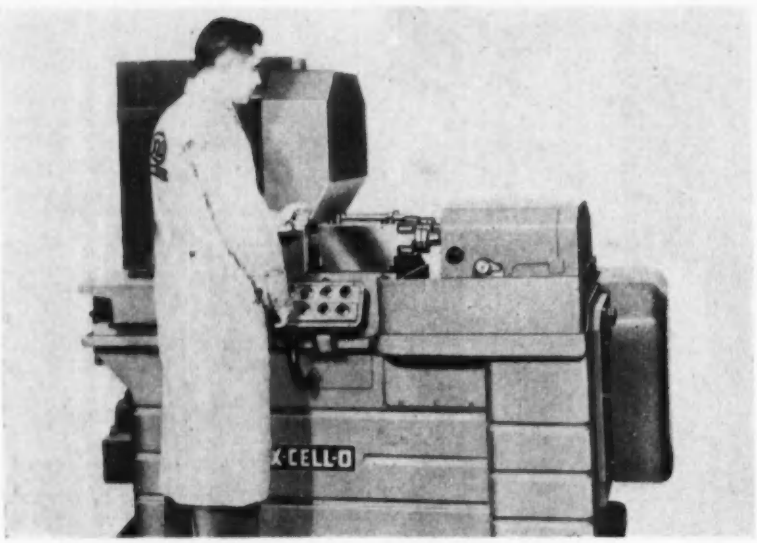
Multichannel direct writing oscillographs featuring four and six channel systems are available with either ink or combination ink and electric writing units. An electrically controlled chart drive system permits instantaneous speed selection. A total range of sixteen accurate chart speeds is possible from one centimeter per hour to 250 millimeters per second. All speeds are selected with a front panel control or with an accessory remote control unit. The same basic chassis permits the four channel oscillographs to be expanded to six channels. They can be mounted in a standard 19-in. rack or in an attractive console. *Brush Electronics Co.*

**Circle 57 on postcard for more data**

NEW EQUIPMENT PLANT • PRODUCTION

*For additional information, please use postage-free reply card on page 89*

## Boring Machine is Directly Cam Operated




*Ex-Cell-O Style 312 cam operated precision boring machine has hardened and ground cams, carbide-tipped followers.*

The Style 312 precision boring machine is cam operated, and is built for such precision finishing work as contouring, boring, turning, facing and grooving. Cam followers impart the rise and fall of the cams directly to the machine table and cross slide.

This machine is designed essentially to accommodate parts that can be rotated on one or more spindles while the non-rotating tools are supported on the cross slide, as for production contouring work in which forms must be reproduced over and over again within close tolerances. Such forms can be inspected by checking only one dimension, because accuracy and relationship of other dimensions are determined by the cams.

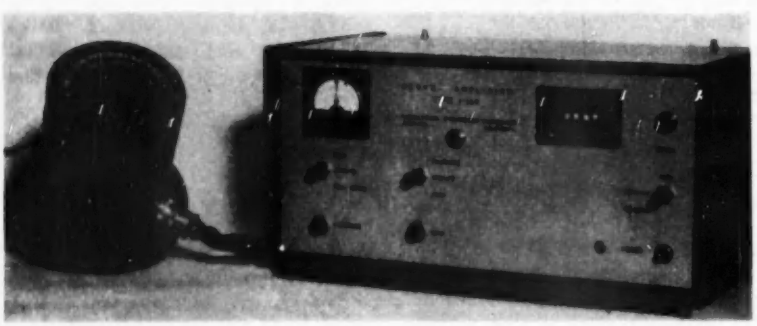
The contour form is obtained by the longitudinal movement of the machine table coordinated with the lateral movement of the cross slide. The table carries the spindles with their drive equipment, is operated in rapid traverse by a pneumatic cylinder cushioned by oil. The feed portion of the table stroke is actuated by a cam opposed by an air cylinder. All cross slide movements also are produced by a cam opposed by an air cylinder. The cam assembly is hinged so that it can be swung out of its compartment for changing cams.

Both the machine table and the cross slide are supported on flame-hardened ways. These ways are widely spaced and fitted with gibs for maximum stability. A power lubricating system automatically delivers oil to the ways during each work cycle. Between the table and the cross slide is a large, sloping chip chute that is cast integral with the base. *Ex-Cell-O Corp.*

**Circle 58 on postcard for more data**

## Dynamic Force Pressure Balance

Non-manual measurement of pressures is accomplished by an electronic precision pressure balance recently released. The balance, Type 37-103, provides a laboratory standard for precise calibration of pressure pickups with accuracy comparable to the highest quality manometers. A visual, digital readout counter with digits to 1000 makes immediate readings possible. The instrument is designed so that readings may be held when required or attached to electrical tabulating devices through a built-in electrical analog d-c output of 10 volts.



*CEC electronic pressure balance for laboratory and field pressure measurement.*

The pressure pickup is engineered so that three types of readings are possible—differential pressure, gage pressure, and absolute pressure. The entire balance system operates on the principal of dynamic force balance. The amplifier may be used with various ranges of pressure sensing pickups. *Consolidated Engineering Corp.*

**Circle 59 on postcard for more data**

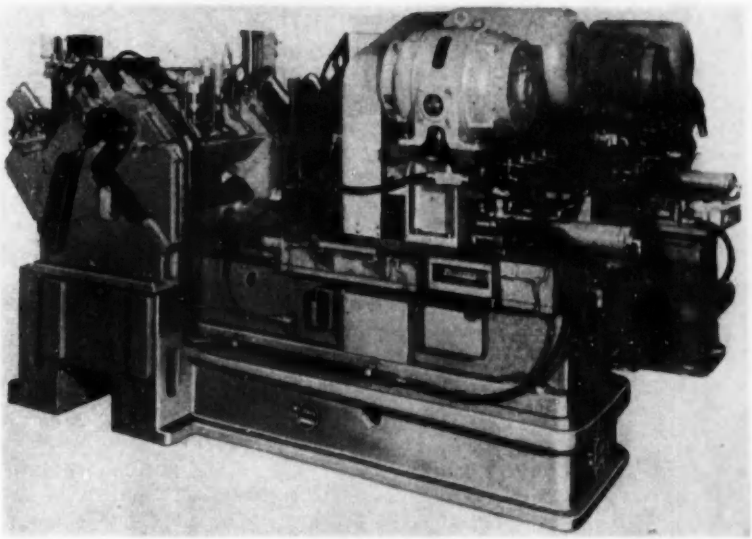
## Precision Machine for Boring Valve Seats and Holes

Concentricity within 0.0005 in. total indicator reading between diameters is the accuracy claimed for an automatic boring machine now available. The transfer-type machine holds this tolerance between valve stem holes and valve seats of V-8 cylinder heads.

A multi-blade tool is used to form the valve seat, and a modified gun drilling tool is used to bore the guide holes. Carbide tools employed in production have given 15,000 valve seats and 2000 stem guide holes between tool changes. Gross production of the machine illustrated is 120 per hour.

One four-spindle head finishes four seats and holes in one pass. A second head completes the remaining operations at a second station. Seat apex tolerance can be held to 0.0015 in., with finish held down to 20 micro-in. *W. F. and John Barnes Co.*

Circle 60 on postcard for more data



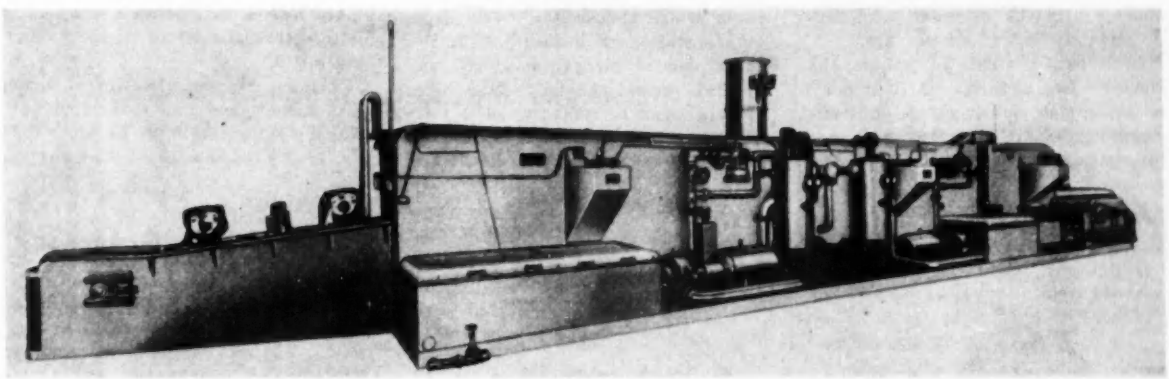
*The Barnes special automatic boring machine for V-8 heads is a self-contained unit which can be operated individually or installed in an automatic transfer line.*

## Transmission Castings Washed by Pin-Point Method

An automatic indexing fixture type, three stage washing machine announced recently was designed to clean 400 automatic transmission cases and bell housings per hour. The pin-point washing action in this machine is achieved through precisely located high pressure nozzles which are said to clean and flush blind and through holes, pockets, shoulders and bosses.

Fixtures with brass pads hold the castings in position. Electrically sequenced, hydraulically powered transfer mechanism and indexing drive index the fixtures into position at each stage, where the drive locks the transfer mechanism for an exact interval of time. Traveling wash, rinse, and blowoff fixtures are indexed with the conveyor. Specifications include 400 and 550 gpm pumps, 125 psi nozzle pressure at 140-180 F, 80-90 psi air pressure with blower optional, magnetic and self-cleaning filters. *International Conveyor and Washer Corp.*

Circle 61 on postcard for more data



*Fixture type International washing machine for pin-point cleaning two types of automatic transmission castings.*

## Metalized Plastic Film

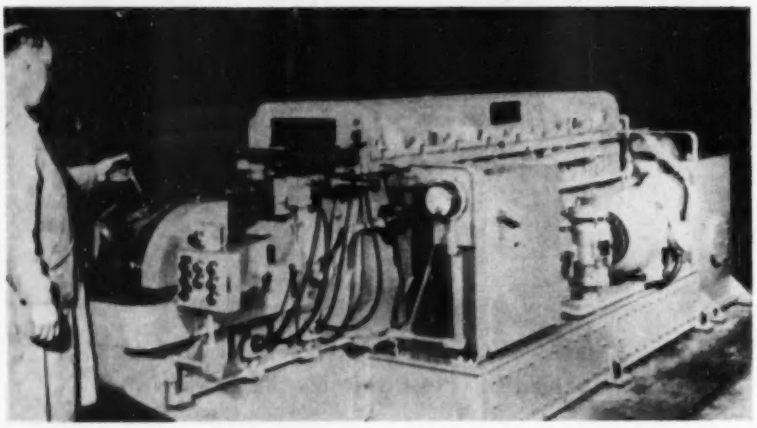
An addition to the line of Mirro-Brite metalized plastic films is Mylar, a polyester film produced by Du Pont. Mylar is the fourth major plastic sheeting to be metalized by the maker, the others being acetate, polystyrene and butyrate. It is said to be extremely durable because of its high mechanical strength. Mylar offers a combination of impact strength, excellent flexlife, high stiffness and good tear resistance. In addition, it exhibits high dielectric strength and a relatively low power factor. Because of its tensile quality, particularly with thin gages like 0.00025 in., Mirro-Brite Mylar can be used for laminations to leather, fabrics, paper and other plastic materials. Successful embossing has been achieved on supported or unsupported film. Since the lamination is accomplished with the colored and plated side locked to the material, the surface is said to possess a protective finish that is resistant to abrasion, solvents and stains. *Coating Products, Inc.*

Circle 62 on postcard for more data

NEW EQUIPMENT PLANT • PRODUCTION

*For additional information, please use postage-free reply card on page 89*

## Continuous Broaching for Connecting Rods



*Lapointe continuous broaching machine—Twenty individual, self-operating fixtures aid in broaching 1800 connecting rods per hour.*

*Rear view photo shows the cover removed from the machine in order to see the drive chain and the delivery mechanism. The work nest is in position to release a part.*

A horizontal type continuous broaching machine has a production rate of 900 to 1800 parts per hour in broaching the sides, face, and half-round of a connecting rod. The part is the customary steel forging, the amount of stock removed being approximately ⅛ in. per surface.

Built with a stroke of 120 in., the machine has a series of individual, self-operating, self-locating, and self-clamping fixtures so arranged that the operator merely has to insert the parts into the work nests. The machine will stop automatically if something should occur to interfere with its normal operation.

It is built with 12-in. and 16-in. double roller bearings for the drive-chain which carries the work pieces by the stationary broaches. The fixtures operate through hardened and ground lateral guides. The drive sprockets can be replaced without removing the drive chains. Sprockets are made in pie-shape segments so that one segment can be replaced at a time.

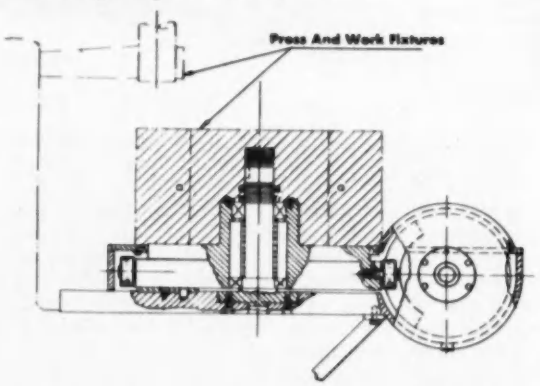
A broach-carrying bridge, hinged on pivots on top of the machine, swings open easily for changing broaches. It will accommodate the main broach assemblies of any type within the capacity of the particular machine.

The machine has a chip conveyor attachment, and two coolant pumps. *Lapointe Machine Tool Co.*

Circle 63 on postcard for more data

## Custom High Speed Index Dials

*Indexing dials featuring roller gear drive are now available on a custom-design basis. Pictured is a 24-station dial with a concave barrel cam, designed for Hydraulic Press. Features available include indexing periods at any portion of the cycle, any number of stops, inherent locking and zero backlash. Choice of timing and linear or angular movements are separate; a six-stop drive may come with timings of ¼, 1/3, ½ or ¾ for the indexing period. (Ferguson Machine and Tool Co.)*




Circle 64 on postcard for more data

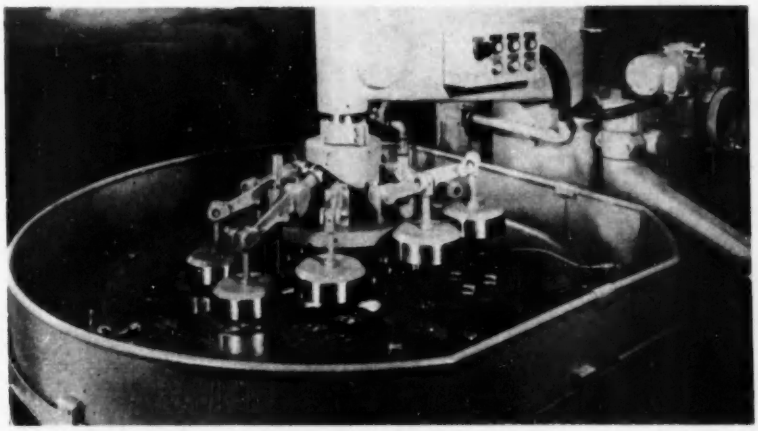
## Two-Switch Governor

Addition of a two-switch governor to a line of speed sensitive switches, and redesign of the former line of governors was announced recently. The new unit contains two snap action switches rated at 10 amp 110 volts ac, and can be used for either opening or closing circuits at any speed over 350 rpm. Each switch is individually adjustable up to 2000 rpm above specified set speed.

On the redesigned governors, the knurled adjusting ring has been eliminated and replaced with three set screws in angle slots, making possible an adjustment range of 20 per cent increase or decrease. *Synchro-Start Products, Inc.*

Circle 65 on postcard for more data

## Flat Lapping in Single Pass Featured



*Norton 36-F flat lapping machine in operation.*

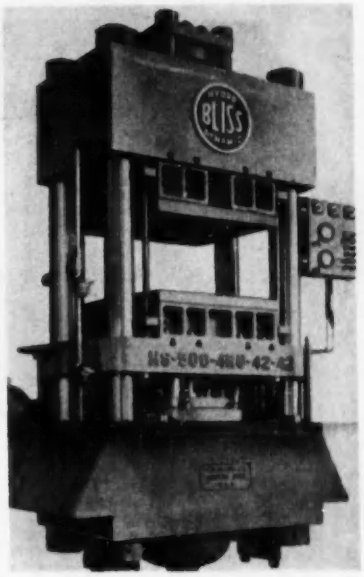
A single face, flat lapping machine, known as the No. 36-F Hyprolap, with semi-automatic feed, has been announced. It provides continual lapping and complete lapping of the work in a single pass around the lap. Lapping in a single pass is possible because of the efficiency of bonded abrasive laps. Cleaner work piece surfaces, free of grit either imbedded or trapped in pores and crevices of the work, is another advantage of bonded abrasive laps. Grit is washed away by the stream of filtered coolant on the lap.

Lapping is interrupted only to true the bonded abrasive lap. Truing is done by a diamond held in a variable speed, power operated truing arm. An opening is provided in the work holder design to permit truing the lap without removal of the work holder.

Work loading and removal, truing of the lap, and machine control are performed from the operator's position. In normal operation, the operator loads with his right hand and removes the finished pieces with his left. A work pressure arrangement automatically applies the proper weight to the parts grouped in each work holder to secure the desired lapping action. This arrangement lifts the weights clear as they pass through the loading station to permit loading and unloading. The weights are then applied to the newly loaded pieces as they are moved out of the loading area. *Norton Co.*

Circle 66 on postcard for more data

## Closed Die Plastics Press



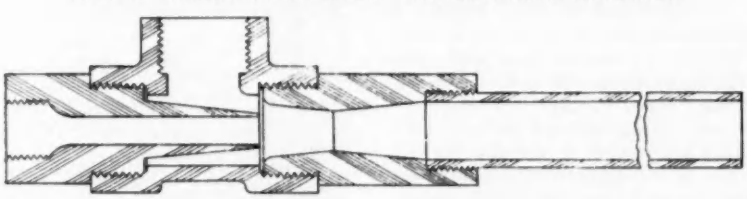

*Bliss 500-ton press for plastics.*

A newly designed 500-ton hydraulic transfer molding press for forming plastic parts in a closed die is built with open tie rod construction to facilitate handling. It combines quick advance and slow pressing speeds with precise pressure controls for the forming of complex plastic structures.

Plastic pre-forms are manually loaded into a transfer cavity, then moved under pressure by the transfer ram into a die cavity. Pressures from main ram and transfer ram are maintained until proper curing is effected. Then both rams retract, the main ram activating mechanical knockouts to release molded parts. *E. W. Bliss Co.*

Circle 68 on postcard for more data

## Nozzle Mixes Powdered Carbon into Solution



*Acid-resistant plastic nozzle for mixing carbon into plating solution.*

An interesting development stemming from a problem common to plating plants is the acid-resistant Inducto-Jet nozzle. Typical application is for mixing powdered carbon into plating solutions for removing normal contamination.

The Inducto-Jet is installed over the solution tank, connected into the fluid circulative system. When connected to a bag hopper, the jet drives the carbon into the solution, the major feature being that all of the dry powder is thoroughly wetted by being brought into intimate contact with the solution while passing through the throat and tailpipe. Time to load a 50-lb bag into the solution using a two-jet assembly is about 15 sec. According to the company, variations can be adapted to other mixing problems where dry powders are employed, although it can also handle certain types of fluids as well. *Whittington Pump & Engineering Co.*

Circle 67 on postcard for more data

## Drill Unit

The model 24 Holomatic drill unit is rated at one hp and uses concentrically mounted electric motor drive assemblies for spindle power. Advance and retract thrusts are developed by air pressure with single or multiple feed rates and rapid travel movements established by adjustable hydraulic controls. Stroke is adjustable to four in. Automatic, semi-automatic or manual cycling, skip drilling, back feeding, manual jogging and positive stop with dwell operations are all easily achieved.

The built-in four-way air control valve can be actuated by either air or electric solenoid valves. *Hause Engineering.*

Circle 69 on postcard for more data

# NEW EQUIPMENT — PLANT • PRODUCTION

*For additional information, please use postage-free reply card on page 89*


*The Yale G-52 Series fork lift truck*

## Gasoline Series Added

A series of compact gasoline fork lift trucks with a high power-weight ratio, called the G-52 Series, offers pneumatic or solid tires in 2000, 3000 and 4000-lb capacity models.

The 2000-lb model can negotiate a right angle corner in a 57-in. aisle or right angle stack in a 112-in. aisle. Built on a 43-in. wheelbase its overall length is 72 in. Height to the top of the steering wheel is 50½ in. and to the top of the channel as low as 68 in. Overall width is 32½ in. Lift speed is 50-55 fpm; lowering 65-75.

Powered with a 25-hp engine, it reaches a top speed of eight mph through a transmission with two speeds forward and two speeds reverse. Speed is controlled by a governor. Directional control and gear shift are located on the steering column. It is equipped with fluid coupling, hypoid gear drive and four pinion differential. *Yale & Towne Mfg. Co.*

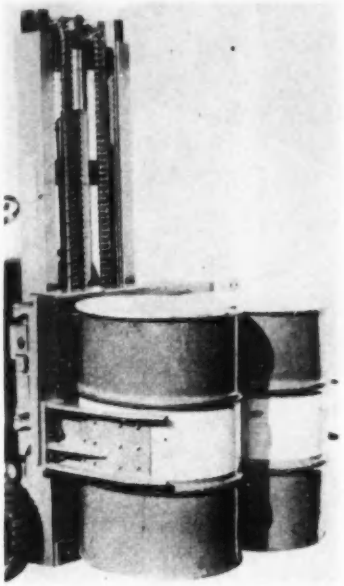
Circle 70 on postcard for more data

## Underwriters' Labeled Trucks

A complete line of standard industrial trucks is now listed by Underwriters' Laboratories for semi-hazardous operations involving risks.

Industrial trucks receiving Underwriters' Laboratories EE labels for semi-hazardous operations include three BF standard Skylift models with rated capacities of 2000, 3000, and 4000 lb. and three LFS models with rated capacities of 4000, 5000, and 6000 lb. Previously the firm's operator-led Transporter, Transtacker, and Transtractor trucks had met UL's requirements for materials handling in semi-hazardous areas. *Automatic Transportation Co.*

Circle 71 on postcard for more data



## Handles Drums

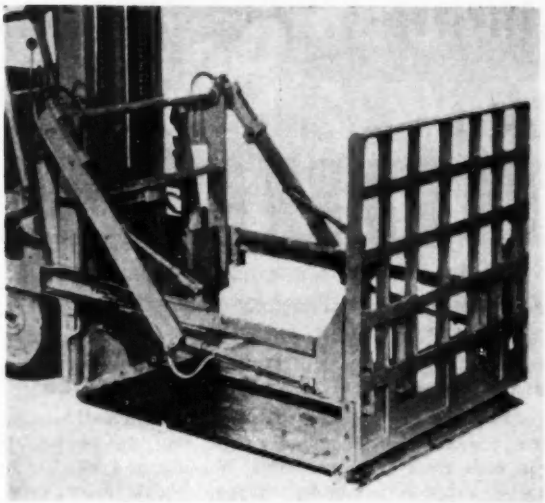
*Mechanical handling of drums is now possible with a series of multiple drum carriers controlled hydraulically from the driver's seat. The drum clamps lift and transport one, two or four drums at one time. Special curved, pivot-mounted arms have ribbed rubber gripping surfaces. (Towmotor Corp.)*

Circle 72 on postcard for more data

## Clutchless Fork Truck


*The M-324 fork lift truck with a capacity of 3000 lb at 24-in. load center features Mobil-Matic Drive, a heavy-duty, oil immersed multiple disk clutch, a constant mesh transmission and a fluid coupling. There is no clutch pedal. The truck has two speeds forward and two reverse. Equalizers mounted on each rear wheel and connected hydraulically cross compensate the truck when the front or rear wheels pass over bumps or depressions. (Lamson Moblift Corp.)*

Circle 73 on postcard for more data



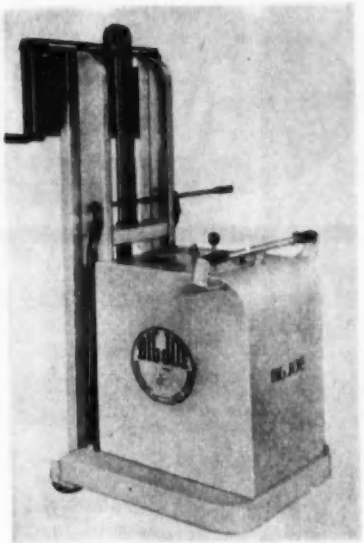
*Clark Pul-Pac installed on a fork lift truck*

## Special Handling Devices are Redesigned

An improved design for Pul-Pac and Pusher units has been announced. The Pul-Pac is a combination push-pull attachment that permits the use of a thin carrying sheet instead of the conventional type wooden pallet. The Pusher device, which does not have a gripper jaw on the rack, eliminates manual unloading of cartons, bags, drums or other material stored on pallets. Both devices are available for factory or field installation on gas and electric Clipper and Carloader model fork trucks.

Unequal stress from off-center loads is absorbed through a 1½-in. diam solid equalizing shaft which distributes power equally through lever arms to the rack. The Pul-Pac gripper jaw is not detachable. Hydraulic gripping action is improved through use of a sequence valve which coordinates actuation of the gripper jaw with movement of the rack. The gripper jaw is automatically closed in a gripping position an instant before the rack moves forward. *Clark Equipment Co.*

Circle 74 on postcard for more data



*The Big Joe Counterweighter is said to have unusually low overall height.*

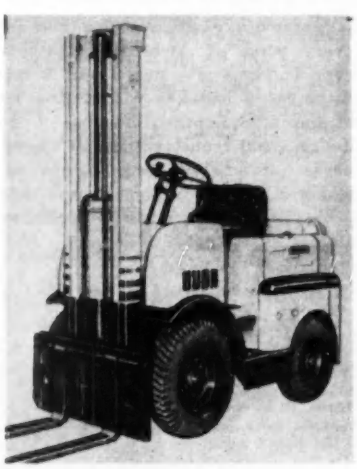
## Light Lift Truck

A light weight, battery operated, hand propelled hydraulic fork lift truck can handle double faced pallets, wire coils, tote pans, rolls, dies, jigs, carboys, without front straddles. It is said to have the lightest counterweight ever applied to a 1000-lb lift truck. It features adjustable forks and optional ram and roll attachments. *Big Joe Mfg. Co.*

Circle 75 on postcard for more data

## Choice of Engines

Two fork lift trucks, the FTP40-24 (gasoline) and FTPD40-24 (Diesel),



*Buda 4000 lb fork truck*

are rated at 4000 lb capacity at a 24 in. load center. Included are: full, front-vision instrument panel; automotive type single lever gear shift mounted on steering column; fingertip, flip-over parking brake; quick-change heavy-duty clutch; full-floating, self-energizing brakes and center point steering. Both offer a choice of five mast heights, and optional torque converter. *Buda Co., Div. of Allis-Chalmers Mfg. Co.*

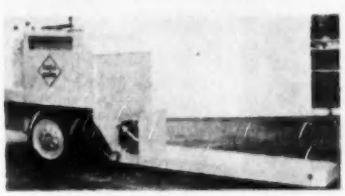
Circle 76 on postcard for more data

## Stand-Up Tractor

On the model SX-24 Tractor Ox, the latest addition to a line of electric industrial trucks, the operator stands in a space provided at the rear of the unit. This battery-powered tractor has 200 lb rated drawbar pull at 3¼ mph, and a speed of 6¼ mph with no load and 3¼ mph with 10,000-lb rolling load. A 24-volt battery is standard. The series is also available in walking operator, sitdown, and radio remote controlled models. *Barrett-Cravens Co.*

Circle 77 on postcard for more data

## Takes Various Skids



*A 6000-lb capacity low lift platform truck will handle skids with legs only 7½ in. high. The vehicle also has 10 in. of platform lift so that skids with legs up to 14 in. high can also be accommodated. Elwell-Parker Electric Co.)*

Circle 78 on postcard for more data

# NEW PRODUCTS

*FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89*

## Torque Reversal Prevented with Locking Device

A device for transmitting torque while preventing reverse torque action transmits torque in both clockwise and counterclockwise rotation and can be used to lock a driven mechanism in any angular position. Nobak is now available to manufacturers. Input member, left, and output member, right, are ball-bearing mounted. Lock ring, in section, is keyed to the housing, and lock bar in center, through which drive takes place, prevents output member from driving input member. *Ahlberg Bearing Co.*

**Circle 36 on postcard for more data**

## Thermostat Uses Wax-Type Thermal Unit

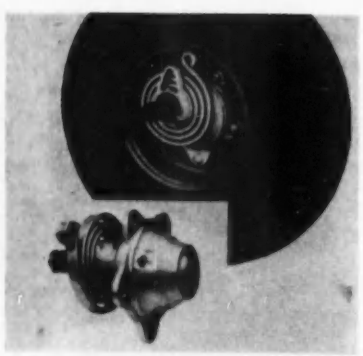
A thermostat actuated by a compact thermal unit has been developed for use in pressurized cooling systems. The unit is charged with a special wax-like composition, which melts and increases in volume as the water in the engine cooling system begins to heat up and solidifies again upon cooling. The unit is said to be unaffected by pressure built up within the system, but responds only to temperature changes. *Robertshaw-Fulton Controls Co.*

**Circle 37 on postcard for more data**

## Plastic Shaft Retainer Ring

Plasti-Ring shaft retainers are rolled into a prepared groove to serve as a positive-holding shoulder, highly resistant to friction and wear. They are said to withstand up to 250 lb in direct shear. Because of their light weight, they do not create motion forces which might injure the assembly. The ring is injection molded of oil-and-grease-resistant vinyl. *Shakeproof, Div. of Illinois Tool Works.*

**Circle 38 on postcard for more data**



## Stub Axle for Trailers

Further development of the Floating Hub shock absorption system now includes a complete axle assembly for boat, camp, horse and other transport trailers. It can mount pneumatic, semi-pneumatic or cushion type tires with conventional wheel mounting bolts. The suspension-type unit employs a stub axle as an integral part, which inserts into tubing or a clamping bracket. *Bassick Co.*

**Circle 39 on postcard for more data**

## Power Brake Kit

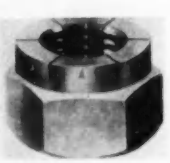
Power brakes are now available for every make of American passenger car. The unit is compact, and is said to be easily installed without the use of special equipment. Because of the design and construction, it never needs lubrication, according to the maker. It is available in complete packaged kits for field installation and is distributed nationally. *Midland Steel Products Co.*

**Circle 40 on postcard for more data**

## Aluminum Locknut

An all-metal, self-locking locknut of 24ST aluminum is designed to meet or exceed minimum tensile requirements for steel nuts. Latest addition to the Flexloc Line weighs 65 per cent less than steel and is for use on steel bolts or studs where temperatures do not exceed 250 F. It meets specifications AN-N-5b and MIL-C-5541. *Standard Pressed Steel Co.*

**Circle 41 on postcard for more data**



# Free INFORMATION SERVICE

**Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.**

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## FREE LITERATURE

### Automatic Grinding Machines 1

Catalog AG describes a line of automatic precision rotary and surface grinding machines, which includes Rotamatic, Planematic, Grindmatic and Profilematic. Solutions to actual grinding problems are illustrated, showing specific applications for each model. *The Standard Electrical Tool Co.*

### Heat Treating 2

A bulletin on furnaces for heat treating non-ferrous metals and alloys is now available. Forming, annealing, solution heat treating and aging are examples of some of the process equipment illustrated and described. *Surface Combustion Corp.*

### Hardening and Drawing 3

Recently released is bulletin SC-164 on a complete line of furnaces for hardening and drawing or tempering operations. Included in this fully illustrated bulletin are direct-fired and controlled atmosphere furnaces of both the batch and continuous types. Completely automatic, harden and draw lines are of special interest. *Surface Combustion Corp.*

### Turret Drill 4

How the Burgmaster automatic, hydraulic, six-spindle, Model 2BH and the eight-spindle, Model 3BH can increase production, improve quality, decrease handling and cut production costs are all described in a new brochure. *Burg Tool Manufacturing Co.*

### Ductile Cast Iron 5

Bulletin DI-1—12 pages with illustrations, graphs and charts—describes a recently developed family of ductile irons which possesses the process advantages of cast iron and which has engineering properties that approach those of cast steel. Strengths up to 120,000 psi, substantial ductility and resistance to heat and wear are reported. Potential applications in numerous fields are indicated. *International Nickel Co.*

### Aircraft Fasteners 6

Paneloc aircraft fasteners are thoroughly described in a recently published catalog, C-316. Complete engineering data is provided. *Scovill Manufacturing Co.*

*(Please turn page)*



**VOID After Oct. 1, 1954** 8/1/54

**Circle code numbers below for Free Literature, New Plant Equipment, or New Product Information**

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## Textured Metal 7

A pattern selector gives complete specification data on twenty-six Rigid-Tex metals patterns. The selector shows an actual photo of each textured metal pattern with an arrow indicating direction of width. A cut-out window gives pattern number, width, thickness and depth automatically as the pattern is dialed. *Rigidized Metals Corp.*

## Polyester Film 8

The first issue of "New Developments In 'Mylar' Polyester Film" has been published. This informative booklet gives several new and interesting applications for "Mylar." *E. I. duPont de Nemours & Co.*

## 12-Point Nuts 9

Available for distribution is a 12-page catalog of 12-point nuts. The nuts are made in plain and self-locking types. *National Machine Products Co.*

## Industrial Ovens 10

A 16-page bulletin on industrial ovens has been issued. Engineering, manufacturing and installation for all processing ovens is described. Bulletin covers oven types, application to industry, source of heat, selection of heaters, control of heat, distribution of heat. *Newcomb-Detroit Co.*

**USE THIS POSTCARD**

## New Steel Products 11

A 26-page brochure describes and illustrates recent expansion of the company and products added to its line. Among these new products are sheet and strip steel. Of particular interest are the new cold rolled strip mill and latest equipment in other plants. *Pittsburgh Steel Co.*

## Switches and Actuators 12

Catalog 101, entitled "Switches for Industry" covers 22 "families" of switches, describing 258 different switches, actuators and enclosures. Dimensionalized photos, complete characteristics, electrical ratings and technical data are intended to aid the design or plant engineer in the selection of the right switches for his particular applications. *Micro Switch, Div. of Minneapolis-Honeywell Regulator Co.*

## Heavy Duty Gears 13

The June, 1954, issue of *Lubrication* is devoted to heavy-duty gears. Among the subjects discussed are: gear failures; choosing a lubricant; types of lubrication; methods of application; and improvements in performance. *The Texas Co.*

## Radiant Heat Burners 14

A bulletin describes the Model 10-L line of "Radiant Heat" burners which maintain an operating temperature at the refractory of 2300 F. Applications for these burners are: paint, mold, core, moisture and other drying operations; plasticising; heat treating; aging; turn-off; billet heating; etc. *Burdett Manufacturing Co.*

## Automatic Turret Lathes 15

A 24-page illustrated booklet gives 34 case histories covering chucking operations in automatic turret lathes ranging from small, difficult-to-handle parts to the heavy metal removal on large, intricate work pieces. *Potter & Johnson Co., a subsidiary of Pratt & Whitney.*

## Shell Molding 16

An illustrated, 28-page brochure (CDC-272) describes the latest developments in shell molding. Information on resins and new foundry techniques in this field are contained in the handbook. General Electric has installed an experimental shell molding foundry at Pittsfield, Mass., for the purpose of studying and developing new molding techniques. This experience has been incorporated within the covers of the brochure. *General Electric Co., Chemical Materials Dept.*



**VOID After Oct. 1, 1954** **8/1/54**

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FIRST CLASS
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New York, N. Y.

# DO YOU HAVE ANY QUESTIONS ABOUT LEAD-TREATED STEELS?

| QUESTION | ANSWER |
|---|---|
| What is a lead-treated alloy steel ? | It is an alloy steel made to any standard specification but with the addition of lead, usually in the range of 0.15—0.35%. |
| What special advantages does the lead addition impart to the alloy steel . . . . . ? | It improves the machinability, increases productivity and reduces costs. |
| In what qualities and forms are lead-treated alloy steels available ? | Any Aristoloy steel can be made with a lead addition and supplied in any of our standard sections. |
| Does the lead addition influence in any way the heat treatment of alloy steels . . . . . ? | No. A lead-treated alloy steel responds to heat treatment in exactly the same way as its counterpart without lead. |
| Does the lead addition affect the mechanical properties of alloy steels . . . . . ? | The addition of lead to any steel does not materially affect its mechanical properties. |
| What are the machining properties of a lead-treated alloy steel . ? | Lead-treated Aristoloy steels cut more freely than standard alloy steels, and yield a better surface finish even at higher cutting speeds. Of equal, if not greater, importance is the fact that these steels are less severe on the cutting tools. |
| ARISTOLOY STEELS Where are lead-treated alloy steels most suitably applied ? | Lead-treated Aristoloy steels show to greatest advantage when subjected to complicated or extensive machining operations, or *where it is necessary to machine in the higher ranges of tensile strengths.* |

**COPPERWELD STEEL COMPANY** (Steel Division) **WARREN, OHIO**

# Observations

By Joseph Geschelin

## Cold Forming

We see evidence that many manufacturers are thinking in terms of cold forming for the production of many parts formerly produced by conventional hot forging methods. Just recently we were shown stem pinions, long stepped shafts, and flanged axle shafts—all made from small slugs of steel. One large manufacturer is experimenting with cold forming of small gears as well. Development of these methods not only reduces the initial cost of making forgings, it eliminates scrap, reduces the amount of metal to be removed, and will simplify machine shop practice.

## Automation Progress

Automation has taken industry by storm. We have been talking about it for 15 years or more, although the coined name is of more recent origin. It is time to realize that automation, as a technique, has been with us a long time. The addition of automatic loading and unloading to an automatic machine is one of the earliest examples. The extension of the principle can tie together a big transfer machine, or a complete department. Point is that automation, like any other management device, is subject to the laws of engineering economics. It requires capital investment; it must be approached with the same viewpoint as the acquisition of any other equipment. Does it pay in a given operation or plant? That is the only criterion.

## Surface Finish

Measurement and specification of surface finish on engineering drawings has been a project in ASA for many years. It has assumed still greater significance today since so many parts require fine finishes. It is good news to learn that the project is now at the acceptance stage.

## Cast Cranks

For many years Ford has been practically alone in using cast crankshafts. During the war C-W-C made many large cast crankshafts for Navy engines; demonstrated the utility of the foundry process not only in reducing costs but in speeding deliveries. With the widening use of shell molding cast crankshafts can be made still better, with less material for removal, with closer tolerances. We understand that at least three new V-8's will have cast cranks for 1955, marking the first major break with tradition.

## Foundry Advances

Shell molding has marked the first big improvement in traditional foundry practice since the turn of the century. Its effect has been so pronounced that producers of foundry equipment now are working on new developments that are bound to change the picture of conventional foundry management materially. We hear too of some improvements in techniques that may even outmode shell molding in certain areas.

This issue carries an article on shell molding on page 52.

## Truck V-8's

By next spring we expect to see at least three big truck V-8 engines in production. Although the primary reason for this development is in the need for shorter dimensions to meet overall length requirements, the new engines will offer greater hp/cu in., resulting in a smaller package. Incidentally, this trend to modern V-8's will place truck engines on practically the same basis as passenger car engines from the standpoint of bhp/cu in. and weight/bhp.

## Engine Progress

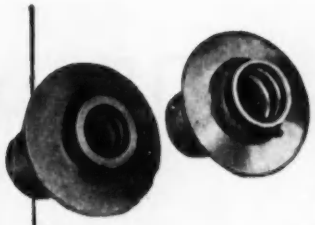
It is safe to say that by the time 1955 model announcements roll around practically all makes—with only a few exceptions—will be powered by modern V-8 engines of OHV design. That means the horsepower race will be on for another year at least. Despite all the publicity during the past year or so the man on the street still does not grasp the objective of high power ratings. It is still necessary to explain that increased horsepower is a safety measure. Power to pass at high speeds on the highway may mean the difference between safety and disaster.

# . . . BOOKS . . .

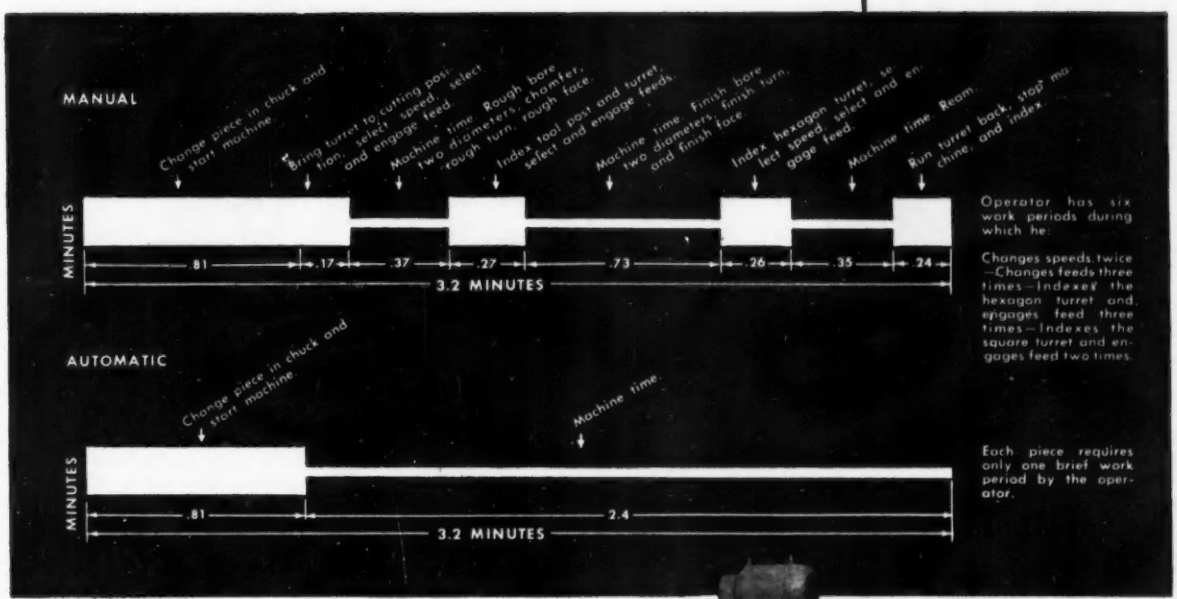
TENTATIVE SPECIFICATIONS FOR COPPER AND COPPER-ALLOY WELDING ELECTRODES, *published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, $0.25.* Five types of copper and copper-alloy covered and bare electrodes are prescribed in this new edition. It was prepared primarily to standardize the electrodes used in inert-gas metal-arc welding, which is gaining wider use in the copper field daily. The filler metals covered include copper; copper-silicon (silicon bronze); copper-tin (phosphor bronze); copper-nickel; and aluminum-bronze. A table gives the chemical analysis of the different classifications in each group and standard tests for verifying conformity of a given electrode to the standard requirements. New packaging requirements are provided for inert-gas metal-arc welding electrodes.

SYMPOSIUM ON NON-DESTRUCTIVE TESTING, *published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, $2.00.* This informative symposium was sponsored by ASTM Committee E-7 on Non-Destructive Testing. It contains the most advanced non-destructive testing methods and techniques in use throughout the world. Although it discusses principally the testing of metal: sheets, rods, castings, forgings, machined assemblies, and the like (plastics, too, are mentioned), it provides excellent data and ideas for non-destructive testing of other materials.

# *how the*
# GISHOLT FASTERMATIC
# *saves man-minutes and money!*



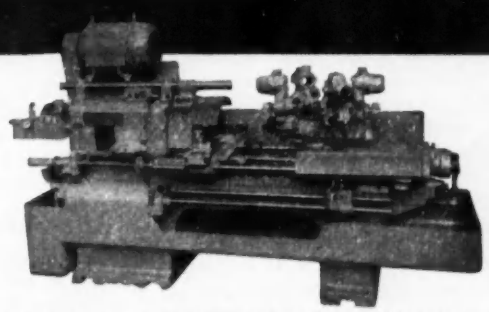
**Here is an actual comparison of the time and work cycle of a manually operated turret lathe and a Gisholt Fastermatic Automatic Turret Lathe. The machining of wheel hubs, shown above, requires 6 operations as follows: rough bore, finish bore, ream, rough face, finish face and chamfer. Note that the manually operated machine takes over 54% of the operator's time whereas the Fastermatic takes only 25% of his time, leaving 75% without interruption.**




That's the story of the Fastermatic in a nutshell—less work time for the operator. The Fastermatic handles all changes of feeds and speeds automatically.

In this case, for example, the other side of the work piece is done by another Fastermatic with substantially the same cycle. One operator keeps both machines constantly under cut and still has ample time for stacking and work inspection. Important, too, is the fact that both Fastermatics are tended by a comparatively unskilled operator.

There are many such cases where Fastermatics can cut costs substantially. Gisholt engineers will gladly answer your questions. Write us.



**THE GISHOLT 1-F FASTERMATIC**—*smallest of 3 different sizes which enable you to machine a maximum number of surfaces in one chucking, handling all changes in speed and feed automatically. On this job, turret was double-tooled so that two parts were completed with each revolution of the turret. Ask for literature.*

**GISHOLT MACHINE COMPANY**
**Madison 10, Wisconsin**

GISHOLT

**THE GISHOLT ROUND TABLE** *represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.*

# NEW AIRCRAFT PRODUCTS

*FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89*

## Fuel Cap

An accident-proof fuel filler cap has been approved by the Air Force and is now in production. Even if the top

dust cap is left completely unfastened, no gasoline can drain out or siphon out in flight. A perfect seal is provided by a patented self-aligning seat that will always seal. The semi-spherical internal trap door seal is spring-loaded to remain closed at all times except when a fuel nozzle is inserted into the tank, and the greater the internal pressure, the tighter the seal. The new filler cap has been tested to 250 psi without leakage or failure.

The Saeco FV-400 has successfully passed Air Force requirements under MIL-C-7244, Type III, and is now being installed on aircraft in production at Lockheed Aircraft Corp.

The new cap fits standard four in. AN mountings and weighs only 1½ lb. No safety chain is required and the dust cover can easily be opened. *Santa Anita Engineering Co.*

Circle 46 on postcard for more data

## Ducting

A complete line of heat and air transfer ducts for aircraft, which according to the manufacturer conform to Civil Aeronautic Specification CAR-04b-075 (b) "Fire-Resistant," are now in production. Depending on diameter, the ducts are made from highest quality asbestos cloth or tubing, coated with Neoprene or Neoprene cement. I.D. range from a minimum of ⅜ in. to whatever may be required by design and use. It is reported they are suitable for use at temperatures from minus 65 F to 250 F in heating, ventilating and anti-icing systems of aircraft, as well as for connecting metal ducts or covers over equipment and wiring. *Packing Div., Raybestos-Manhattan, Inc.*

Circle 47 on postcard for more data

## Fast Fault Finder

A universal automatic electrical circuit analyzer is said to test any complex aircraft cabling system or control panel assembly at speeds up to 200 circuits in 20 seconds. It is designed to test automatically for line and insulation resistance simultaneously up to 200 megohms featuring 28 and 500 volt d-c test ranges.

Two hundred separate test positions are provided with separate facilities for operating external devices such as relays, at any test position. Multiplier sections can be added, up to a 600 or 1200 circuit capacity. Visible matrix type reference charts pinpoint circuit errors; fault pattern appears readily to indicate interacting circuitry. *Electronics Div., Dit-Mco, Inc.*

Circle 48 on postcard for more data

## Landing Lamp

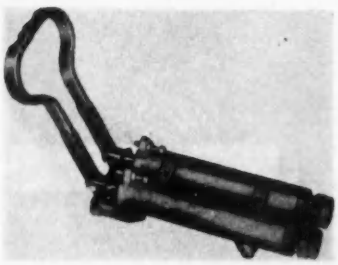
An improved airplane landing lamp rated at 600 watts is said to provide a longer more uniform service life than that of its predecessor, more stable beam pattern than heretofore, lower maintenance costs, and greater assurance of safety.

The new landing lamp, No. 4559, is identical in all respects with the lamp it replaces except for its filament construction. Unlike the old filament in the lamp, which employs two supports looped around the filament, the new lamp's filament uses no supports to wear away the filament by normal airplane vibrations which set up a rubbing action. *General Electric Co.*

Circle 49 on postcard for more data

## Brake Valve

An emergency air brake valve has been developed which provides delivery pressures from zero to 800 psi.



Modified models are also being manufactured which provide delivery pressures to 1500 psi. Applied pressures are directly proportional to the travel of the control handle. The new unit is available in a single barrel valve model which is operated by the brake pedal or by hand or in a double barreled model which is hand operated and allows differential braking.

The unit is designed to receive inlet pressures up to 3000 psi. Since this brake valve is of balanced design inlet pressure variations do not affect delivery pressures. The valve allows controllable deceleration which eliminates locking of brakes. Another feature of this new valve is that it can be vented overboard. *Cornelius Co.*

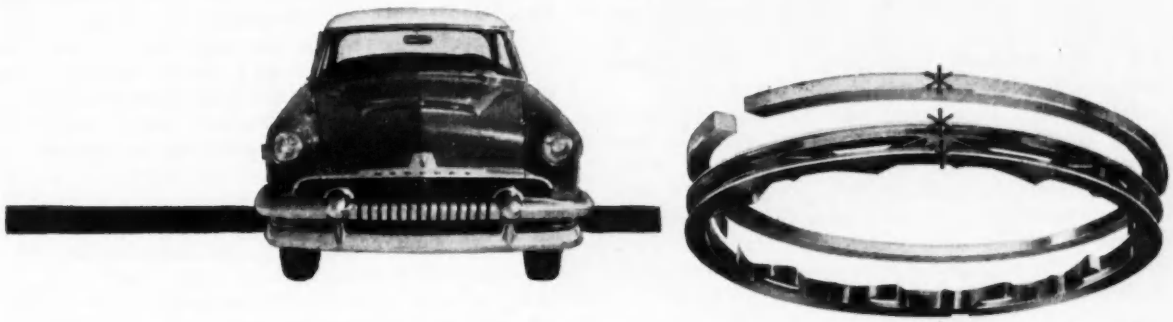
Circle 50 on postcard for more data

## Filter Elements

Porous stainless steel filter elements designed for air-borne high-temperature hydraulic oil service are now available. Porous material used is type 316 stainless steel and may be used at temperatures in excess of 600 F. These filter elements remove two, three, seven, 12, or 22 micron size particles as desired. Pressure drops are low and adequate filter surface is provided for long service life. Units are presently available in sizes rated to handle 0.5, three, six, and 12 gpm of oil. *Aircraft Porous Media, Inc.*

Circle 51 on postcard for more data

# MERCURY



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**THE STANDARD OF COMPARISON**

# METALS

***Shipments of Shale Zinc in June Highest for More than a Year. Quicksilver Soars to $290 per Flask. Lead Demand Moderate.***

*By William F. Boericke*

## Steel Prices

Settlement of the threatened steel strike by granting a wage increase that totaled 9-12 cents per hour was followed almost immediately by a hike in steel prices that averaged $3.24 per ton according to the finished steel composite base price of *Iron Age*. This brought the price to $95.92 per ton.

All steel products were not advanced uniformly. The largest price increase was in electric sheets, up about $7 per ton. Smallest was in bloom billets, up $2. Hot rolled sheets cost $2.50 more per ton, cold rolled $3.50. Galvanized sheets went up a similar amount to $109 per ton.

Steel users were not happy over the new prices but it appears that market demand was little affected. With the steel operating rate averaging only 60-65 per cent of capacity through the first half of July, the full effect of the higher prices is still uncertain. Most makers of steel products have said they will have to absorb the increases. Competition is too tough to permit passing them on to the final distributors.

Of course, it is true that steel users have benefited from substantial reductions during the last nine months, even although the industry's posted prices have remained nominally unchanged. Freight absorbtion, elimination of extra charges and disappearance of premium prices have meant in effect lower prices for many buyers, and a corresponding reduction in profits for many producers.

## Uncertainties Ahead

There is even some doubt that the new price increases can be held. With the industry using only about 60-65 per cent of its productive capacity and many of the smaller companies operating at a lower rate than this, a price increase is unlikely to prove a business stimulant. In short, over the longer term, the steel price appears vulnerable.

On the other hand, steel producers are more determined than ever to have a decent profit margin to replace their present facilities as they wear out. They assert they are passing on only about two-thirds of the new wage costs to their customers and absorbing the remainder. They think they can hold the price line with major inventory readjustments completed and manufacturing schedules calling for heavier orders from consumers. While July business will probably be slow because of the vacation period, August should prove better and by fall there should be a fairly good upturn.

According to the American Iron & Steel Institute, steel production for the first six months of the year totaled 44.1 million tons, a drop of 13.8 million tons from the first half of 1953. The second quarter of 1954 came to 21.8 million tons against 28.9 million tons in the same quarter of 1953. Actual output in the second quarter of this year was greater than in the first quarter in spite of a lower operating rate, furnishing proof of the superior operating efficiency of the mills.

In best demand during July were structural shapes and oil country goods. Galvanized sheets were wanted for grain bin construction. Steel scrap supplies were abundant and by July 15 prices had fallen for the fifth consecutive week and dropped to $26.75 per ton.

## Stainless Steel Feels Competition

Manufacturers of stainless steel have had difficulty in advancing prices to compensate for higher wage costs. Severe competition and a generally slow demand have caused them to hesitate. To raise prices would expose them competitively to further inroads from aluminum in some important markets. Orders improved a little before the wage settlement was announced and there is unwillingness to take any chances in losing business.

Yet stainless steel manufacturers face a hard situation. Their labor cost is higher than for manufacturers of carbon steel, hence the higher wage rates hit them violently. Quite possibly a selective advance will be made. Little price change will be seen for stainless flat rolled products like strip and sheet where competition with aluminum is keenest. But increases may be witnessed for bars, plates, wires, and tubing.

## Copper Demand Continues Good

While copper business slackened off seasonally in July because of the annual vacation period at the fabricating plants, demand remained extraordinarily good. Sales abroad were excellent and prices were firm. The Chilean government raised its price ¼ cent per lb to 29¼ cents for September delivery, presumably for sale to European buyers.

Demand has been strong for wire, tubing and sheets, principally from the utilities and construction industries. Business is slower for the brass fabricators

(*Turn to page* 126, *please*)


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- ☐ to make a good product better, OR . . .
- ☐ as a new source of supply for you, OR . . .
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# News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Continued from Page 39

and construction of experimental vehicles.

At the opening of the engineering building, it was noted that out of the total funds appropriated by Congress for the Defense Dept., 85 per cent is spent for actual production of weapons and equipment. Of the remainder, 13 per cent is spent on design development, while two per cent goes for research.

### Factories Set Records For Car Sales in June

Although overall car sales to mid-year were slightly under last year, several makers reported new monthly records for June. Ford, Cadillac and Oldsmobile were among those which pushed their sales to new highs.

Ford reported that its dealers broke all sales records for the first six months, with 222,816 Ford, Lincoln and Mercury cars and trucks sold during June alone, the biggest sales month in its history. Total Ford company sales for the first six months amounted to 1,040,099 vehicles, a 41 per cent increase over the same period last year, when strikes curtailed production.

Cadillac deliveries, which were up during March-May over comparable months last year, climbed during June for the fourth consecutive month, with deliveries about 13 per cent higher than any previous monthly total. Deliveries for the first six months rose 20 per cent over the six-month period last year.

A total of 41,166 sales were reported by Oldsmobile during June to top the 1953 June figure by more than 5000 cars. The total was more than 400 cars greater than the previous all-time single-month record set in April.

## 1954 RETAIL CAR SALES BY PRICE GROUPS*

### Number of Cars

| | May | | | | Five Months | | | |
|---|---|---|---|---|---|---|---|---|
| | 1954 | | 1953 | | 1954 | | 1953 | |
| Price Group | Units† | % of Total | Units† | % of Total | Units† | % of Total | Units† | % of Total |
| Under $2,000 | 309,563 | 59.68 | 292,927 | 54.46 | 1,303,129 | 58.95 | 1,252,035 | 53.88 |
| $2,001 to $2,500 | 130,956 | 25.25 | 152,923 | 28.44 | 571,996 | 25.87 | 653,874 | 28.14 |
| $2,501 to $3,500 | 58,282 | 11.24 | 69,787 | 12.98 | 241,777 | 10.94 | 319,824 | 13.76 |
| Over $3,500 | 19,874 | 3.83 | 22,154 | 4.12 | 93,831 | 4.24 | 98,131 | 4.22 |
| Total | 518,675 | 100.00 | 537,791 | 100.00 | 2,210,732 | 100.00 | 2,323,864 | 100.00 |

### Dollar Volume of Sales*

| | May | | | | Five Months | | | |
|---|---|---|---|---|---|---|---|---|
| | 1954 | | 1953 | | 1954 | | 1953 | |
| Price Group | Dollars | % of Total | Dollars | % of Total | Dollars | % of Total | Dollars | % of Total |
| Under $2,000 | $563,243,980 | 51.21 | $522,243,006 | 45.97 | $2,372,888,625 | 50.47 | $2,243,304,179 | 45.29 |
| $2,001 to $2,500 | 300,127,158 | 27.28 | 340,176,401 | 29.95 | 1,307,307,135 | 27.81 | 1,461,190,550 | 29.50 |
| $2,501 to $3,500 | 158,240,280 | 14.47 | 191,283,258 | 16.84 | 660,506,958 | 14.05 | 877,560,795 | 17.72 |
| Over $3,500 | 77,500,496 | 7.04 | 82,272,884 | 7.24 | 360,823,659 | 7.67 | 370,920,057 | 7.49 |
| Total | $1,100,111,918 | 100.00 | $1,135,975,549 | 100.00 | $4,701,526,377 | 100.00 | $4,952,975,589 | 100.00 |

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.
†—New registrations of American made cars only. Does not include imported foreign cars.

### Ford Forms Department For Mobilization Plan

A new department, which will plan the allocation of company facilities for defense work in the event of mobilization by the Government, has been formed by Ford Motor Co. In addition, the department will be charged with handling current Government requirements for defense goods, including research and development. Head of the new mobilization planning unit is Donald C. Pippel, engineer and ex-Army officer.

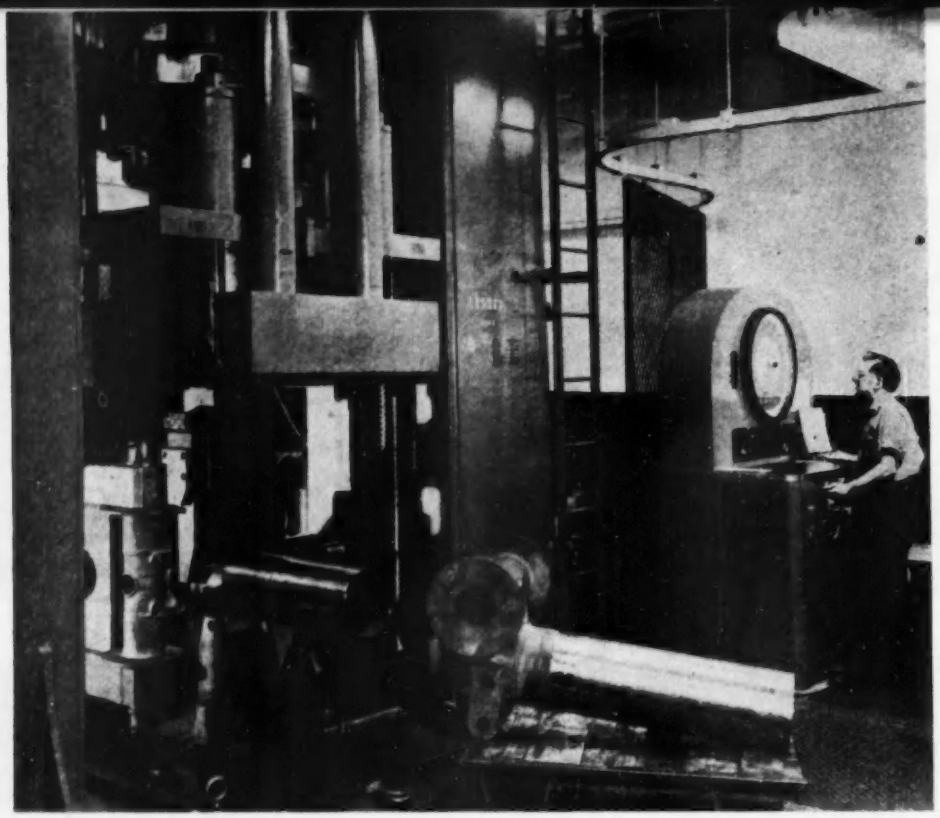
(*Turn to page* 102, *please*)

## FIVE MONTHS' SALES IN NEW ENGLAND SHOW SLIGHT GAIN OVER 1953 PERIOD

### Regional Sales of New Passenger Cars

| Zone | Region | May 1954 | April 1954 | May 1953 | Five Months 1954 | Five Months 1953 | Per Cent Change: May over April | May over May, 1953 | Five Months 1954 over 1953 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | New England | 37,033 | 32,567 | 33,769 | 136,617 | 136,516 | +13.71 | + 9.67 | + .07 |
| 2 | Middle Atlantic | 98,901 | 106,533 | 101,687 | 431,189 | 433,912 | - 9.04 | - 4.89 | - .63 |
| 3 | South Atlantic | 64,646 | 55,888 | 65,996 | 261,945 | 270,885 | +16.49 | - 1.74 | - 3.30 |
| 4 | East North Central | 121,747 | 132,626 | 143,506 | 568,538 | 611,864 | - 8.20 | -15.22 | - 7.06 |
| 5 | East South Central | 26,757 | 23,706 | 24,232 | 111,116 | 111,909 | +12.87 | +10.42 | - .71 |
| 6 | West North Central | 56,044 | 55,810 | 55,927 | 222,679 | 232,581 | + .42 | + .21 | - 4.26 |
| 7 | West South Central | 49,021 | 40,729 | 47,997 | 207,894 | 212,967 | +20.36 | + 2.13 | - 2.39 |
| 8 | Mountain | 15,280 | 15,322 | 17,048 | 65,206 | 78,178 | - .27 | -10.37 | -16.59 |
| 9 | Pacific | 53,216 | 44,996 | 50,121 | 213,999 | 249,388 | +18.27 | + 6.18 | -14.16 |
| | Location Not Determinable | 113 | 145 | | 898 | | -22.07 | | |
| | Total—United States | 520,958 | 508,102 | 540,575 | 2,220,081 | 2,338,000 | + 2.53 | - 3.63 | - 5.04 |

States comprising the various regions are:—Zone 1; Conn., Me., Mass., N. H., R. I., Vt.—Zone 2; N. J., N. Y., Pa.—Zone 3; Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4; Ill., Ind., Mich., Ohio, Wis.—Zone 5; Ala., Ky., Miss., Tenn.—Zone 6; Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7; Ark., La., Okla., Tex.—Zone 8; Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9; Cal., Ore., Wash.



*The landing gear piston is tested after excess flash has been removed and after heat treating, under loads up to 80% of yield strength. Material is steel tubing 10¼ in. diam with ½ in. wall.*

# Large Welded Parts Feasible When Proof-Tested

IN fabricating components of large aircraft landing gears, the Cleveland Pneumatic Tool Co. makes numerous parts by flash butt welding lengths of steel tubing to mating drop forgings. For quality control of such welded parts, the company proof-tests all of the welds.

The size of such parts has been increased and the ease of testing large parts has been improved by recent installation of a one-million-lb hydraulic testing machine built by Baldwin-Lima-Hamilton Co. Flash butt welds with cross sectional areas up to 67 sq in. and having diameters up to 30 in. can be proof-tested in this floor-type testing machine.

Flash butt welded parts are given bending tests in four positions, using specially designed adjustable fixtures to hold the parts. For production testing the fixture is used in one position for a series of tests of a group of parts, then it is re-set for the succeeding test.

Production testing of welds in landing gear pistons is fully justified by the advantages resulting from the use of flash butt welding in manufacture instead of making a one-piece forging. Not only is there a considerable saving in the size of the drop forging required and the amount of machine work necessary to fabricate the part, but the welding process permits use of smaller forging machines and dies. This permits the procurement of forgings from a larger number of sources of supply.

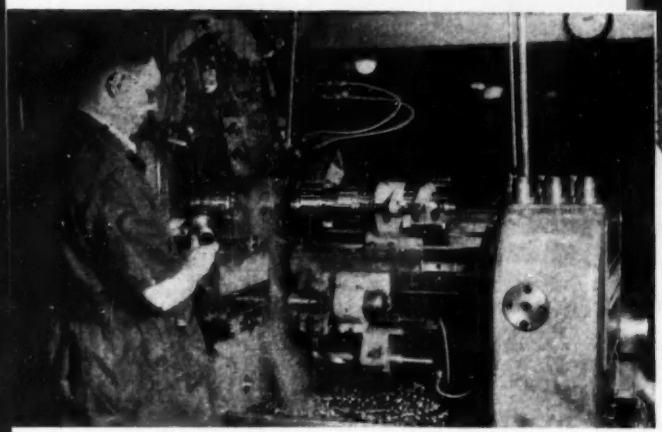
The new testing machine is located adjacent to the machine shop where the parts are finish machined after tests. It is a standard Baldwin-Lima-Hamilton machine of the type that carries all loading and load measuring equipment on the sensitive crosshead and has no machinery under the floor. Special accessories include automatic controls on the Baldwin-Tate-Emery control and indicator cabinet to release the load when it reaches a predetermined maximum or to hold the load for predetermined lengths of time. A foot switch connected into the control cabinet permits the operator to hold the gate into the test area closed during the time load is applied. The operator is protected by two heavy screens that roll into position around the control cabinet on an overhead track.

A clearance of six ft between columns gives all of the space required for test specimens and the fixtures in which they are mounted. Maximum vertical space for compression tests is 15½ ft and for tension tests is 14 ft. Loads can be applied up to 3½ ipm. In addition to the one-million-lb load range the indicator has three other scale ranges: 0-200,000, 0-50,000 and 0-10,000 lb.

Baker INDUSTRIAL TRUCKS tells us...

**"we used to average 2 of these pieces per hour ...from 2 machines with 2 operators**

**now we get 10 pieces with just 1 machine and 1 operator..."**



This commutator core, actual size, is completed in one set-up with HS tools. Close reaming, trepanning and class 3 thread are required.

## . . . on the 5½ inch Model M Acme-Gridley Single Spindle Automatic

Another case-history report, this time from Baker-Raulang, Cleveland, O., one of the most experienced (101 years old) makers of power industrial trucks and tractors.

This 5 to 1 production gain is the average, though we can show you where and how other Model M customers are getting as much as 10 times their former output. And we believe that such down-to-earth documented evidence far outweighs vague promises, hearsay or experimentation at your expense.

May we give you more information, especially figures on your specific single spindle jobs? Why not let us show you what this machine actually has accomplished . . . with carbide tooling, easy change-overs, operating conveniences . . . performance facts that make such claims of highest output at lowest costs a REALITY?

**If this bar machine offered ONLY**

**predetermined automatic control of the job time-cycle...**

this complete machining of every piece at the same predetermined rate at the end of a shift as at the start would mean faster and more accurately scheduled production. But, when additional operations can be put on to complete the job, or more nearly complete it, on ONE machine—and eliminate present unnecessary added cost for extra man hours and release these extra machines and floor space to other needs—THEN certainly it is important that you have such guarantees to make comparisons on your own work.

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Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

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# News of the AUTOMOTIVE AND AVIATION INDUSTRIES

(*Continued from page 98*)

### Factory Delivery Program Is Opened by Ford

Ford Div. of Ford Motor Co. has opened its first Factory Delivery Dept. in Detroit since the end of the war. Under the plan, purchasers buy their car from a dealer in their home area and pick it up in Detroit. Ford operated a factory delivery office in Detroit before the war and delivered about 10,000 cars.

### Faster Future Aircraft Are Sought by Air Force

Higher-speed combat planes are being sought by the Air Force, which intends to supply supersonic fighters to operational units as soon as possible. Aircraft designers are being told they must plan for fighter planes with top speeds of 1000 to 1400 mph.

In the next four months, the air generals will order $1 billion worth of planes and parts, including an unnamed number of F-100 Super Sabre fighters. The F-100, reported to have a speed of more than 800 mph, will be going to some tactical units late this year.

It is predicted that production of aircraft for the Air Force, barring war, will drop about 2½ years from now to approximately half of the present output of 8000 planes annually. By that time, the buildup to 137 wings is expected to be in its final stages.

### Observer Makes Report on European Engine Industry

Prof. P. H. Schweitzer, head of Engineering Research at The Pennsylvania State University, State College, Pa., returned last month from Europe where he spent the past nine months visiting industrial centers. His main interest was in Diesel engineering developments and in the various countries he devoted considerable time with Diesel manufacturers. He reports that Graz, Austria, now has a greater concentration of Diesel engineers than any other place in the world. German, Swiss, and Austrian engineers suffer from "perfectionism," he says, making a device much better than necessary by perfecting its design when a much simpler unit would answer the same purpose. He concludes that the List Internal Combustion Engine Institute at Graz compares with the Ricardo laboratory in England, not quite as large, but much more modern. Two of the outstanding new engines Prof. Schweitzer saw demonstrated were the loop-scavenged Saurer in Switzerland and the Meurer "Whisper" engine at the MAN plant in Nuremberg, Germany.

**MAMMOTH FLYING WING OF THE FUTURE**

*Preliminary design for a unique helicopter resembling a flying wing with rotors is the subject of this artist's sketch. Emerging from the drawing boards of Bell Aircraft Corp., the unusual craft has rotors mounted on each wing tip and is expected to meet a need for a large passenger and cargo helicopter with twin-engine reliability. Vertical takeoff and landing would be controlled by conventional rotors, but thickness of the wing reportedly would allow for fully retracted landing gear and housing of the engines under current projected Bell plans.*

### Number of GM Shareholders Declines in Second Quarter

General Motors reports it had 493,710 stockholders on record during the second quarter of this year. There were 464,495 owners of common shares and 29,215 owners of preferred stock. The total compares with 495,575 shareholders in the first quarter, an all-time high, and 461,871 in the second quarter last year.

### GMAC Discloses Sizable Program of Refunding

General Motors Acceptance Corp. has announced a $150 million refunding program. It called for redemption on July 29 the $87.5 million issue of its outstanding 2¼ per cent debentures, originally due April 1, 1955. It is also seeking redemption of $40 million of 3¾ per cent notes due May 1, 1955. Funds not required for refunding needs reportedly will be added to working capital.

### Buick Turns Out 2000th Jet Engine

In September, 1952, Buick turned over its first Wright J-65 jet engine to the Air Force. Recently, the 2000th Buick-built engine, a highly improved version of the original power plant, was accepted.

Used in Martin B-57 bombers, Republic F-84-F Thunderstreaks, and a new fighter presently undergoing tests, the J-65 is rated as one of the most powerful jet engines in the world. It weighs about 2500 lb and is in the 7200-lb thrust class.

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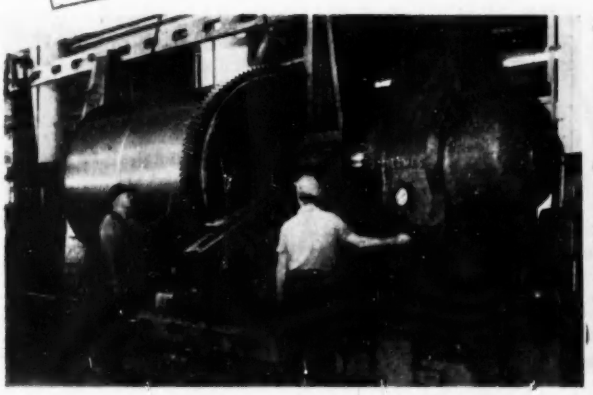
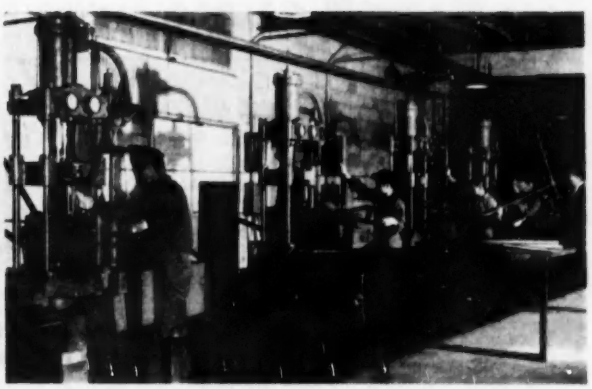


**ALLIANCE MACHINE CO., ALLIANCE, OHIO.**
"Our Elmes 500-Ton Inclined Forcing Press makes possible 50% savings in costs of gear installations on crane hoisting drums." (Illustrated—hoisting drum for 400 ton ladle crane.)



**JAMES STEEL AND TUBE CO., HAZEL PARK, (DETROIT) MICHIGAN.**
"Four Elmes Tube Bending Presses produce 2000 tailpipes per 8-hour shift. Each tailpipe requires seven bends."

AMERICAN STEEL FOUNDRIES

**ELMES ENGINEERING DIVISION**

*hydraulic presses and equipment* .... 1173 TENNESSEE AVE., CINCINNATI 29, OHIO

## Piston Life

(*Continued from page* 50)

complete 200 hours of full load, full speed dynamometer testing at a compression ratio of 8 to 1 without developing fatigue cracks. To meet this specification the piston should complete four million cycles of testing in the fatigue machine at a pressure of 910 psi or one million cycles at 1025 psi without failure. The service portion of the diagram can be used for predicting the fatigue life of pistons only in engines operating at constant load and speed as in industrial service. In the event of fatigue cracking of pistons after extended service, reference to the diagram will establish the necessary pressure to be used for accelerated fatigue machine or dynamometer testing of improved designs.

Laboratory tests of an aluminum piston design are followed by engine testing on a dynamometer. A normal schedule for dynamometer testing consists of a run-in period followed by power, oil consumption, and blow-by runs. Endurance testing is accomplished by a minimum of 50 hours of continuous full throttle operation at a speed at least as high as that at which maximum horsepower is developed. Complete dimensional checks are made of the piston before and after dynamometer testing and careful inspection is carried out to disclose any incipient cracks. To obtain a good comparison of different designs, it is sometimes advisable to run mixed sets of pistons. Characteristics of a piston design under conditions of extreme cold are evaluated by testing for cold noise and scuffing at sub-zero temperatures in a special test cell.

## Eaton Axle Division

(*Continued from page* 57)

for a different cycle duration, thus making it possible to handle three different kinds of parts simultaneously, each one with different case depth. The furnace is held at a uniform temperature, 1700 F on the average, depth of case being developed in proportion to the time of exposure.

The furnace is of gas-fired radiant tube design with automatic quench at the exit end, handling one basket at a time. The equipment is conveyorized to transport the work from the quench to a washer, then to an Electric-Furnace draw furnace.

The foregoing is a brief sampling of a major activity now in progress at Eaton, promising better productivity, quality, and labor utilization.

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# genuine Leather

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Genuine upholstery leather is easy to sell because no other material adds so much value to a car for so little. Leather takes rugged wear and tear in stride . . . comes clean at the wipe of a damp cloth . . . keeps its beauty for years. Leather stands up to sunlight without fading—remains comfortable in all weather—is easy to "slide" on at all times. Leather's colors and finishes are almost limitless and almost indestructible . . . with a rich patina that becomes handsomer with age. Most important, genuine upholstery leather is true trade-in insurance for car buyers because it steps-up the resale value of any car.

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*This new free booklet, "All about Genuine Upholstery Leather," contains some sales-provoking facts about leather and conclusive proof that genuine upholstery leather is the best buy for you and your customers. Write for it today. There's no obligation.*

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- THE ASHTABULA HIDE & LEATHER CO., Ashtabula, Ohio
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- EAGLE-OTTAWA LEATHER CO., Grand Haven, Mich.
- GARDEN STATE TANNING, INC., Pine Grove, Pa.
- GOOD BROS. LEATHER CO., Newark, N. J.
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# BOOKS . . .

DESIGN MANUAL ON AIRCRAFT FIRE PROTECTION FOR RECIPROCATING AND GAS TURBINE ENGINE INSTALLATIONS, *published by Aircraft Industries Association, 610 Shoreham Bldg., Washington 5, D. C. Price, $1.00.* Due to the continuing demand for an authoritative guide on technical and safety advances in aircraft construction, the AIA's Airworthiness Requirements Committee on Powerplant Installations has brought the manual up-to-date and incorporated the additional knowledge and experience gained since the last revision in 1952. It is based on the combined experience and design knowledge of leading powerplant installation engineers in the industry, covering both gas turbine installations and reciprocating engine installations.

GROUND SAFETY IN AVIATION OPERATIONS, *by John A. O'Donnell, published by Center for Safety Education, Division of General Education, New York University, Washington Square, New York 3, N. Y. Price, $1.00.* This manual offers information on the protection of the public, ground handling of aircraft, ramp and field emergencies, ladders and workstands, handling cargo, automotive equipment maintenance and operation, servicing communications equipment, accident investigation methods, and safety committees and inspections. Safety supervisors, maintenance crews, cargo handlers, and all other ground personnel will find in this manual much of value to help them in their work. Flight personnel, who are concerned with safety on the ground as well as aloft, will also find it of great interest and value.

## Vacuum Testing

(*Continued from page* 72)

applications are studied carefully, analyzed thoroughly and laboratory tested before equipment is recommended, since the usual or conventional tools are not satisfactory.

Flow rate measurement through very small holes is being developed and appears to be very promising. Hole size can be determined by comparison. The use of vacuum in these tests has opened many possible applications. This is true where hole size is 0.50 in. in diameter or less. Holes as small as 0.0065 in. diameter with a ± 0.0001 in. tolerance can be measured readily.

Finish on flat surfaces having a light wave tolerance can be measured quickly thus eliminating the necessity of maintaining laboratory type measuring tools in the production line. The vacuum method indicates comparative flatness on an easily observed gage reading.

DU PONT
REG. U.S. PAT. OFF.

PROPERTY AND APPLICATION DATA ON THESE VERSATILE ENGINEERING MATERIALS: "ZYTEL," "ALATHON," "TEFLON," "LUCITE."

NEWS

NO. 5 — 1954

# Clear, Durable Du Pont "Lucite" Is a Versatile Material for Design Engineers

## "Lucite" resists corrosion, crazing, breakage—is economically formed and readily machined

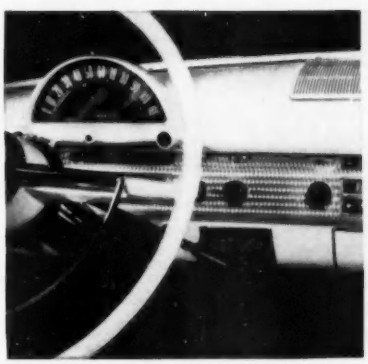
Du Pont "Lucite" acrylic resin is a beautiful, sturdy engineering material with good impact strength, good chemical and excellent weathering resistance. It is easily molded. Because of the many advantages offered by "Lucite", its use in the automotive field is expanding steadily.

**Parking lights** of Du Pont "Lucite" won't lose transparency . . . are shatterproof.

**Interior lights** of Du Pont "Lucite" are ribbed to refract light and eliminate glare.

**Stop lights** of Du Pont "Lucite" assure top visibility in all weather . . . are easy to clean, attractive to look at.

**Steering wheel medallion** of "Lucite" is pleasantly warm to the touch . . . adds decorative touch of great beauty.



**Instrument panel** with fixtures of "Lucite" are easy to keep clean . . . provide maximum visibility.

### "Edge-Lighting" and "Light-Piping"

"Lucite" possesses the property of being able to transmit or "pipe" light around angles up to 48°, or curves of radii as small as three times the thickness of the

(*Continued, column 1 back side*)

**Medallions** of Du Pont "Lucite" can be produced clear or in color . . . add extra sparkle and a note of quality.

## Construction well along on $3,000,000 Polychemicals laboratory in Wilmington

Du Pont is building a $3,000,000 Sales Service Laboratory in Wilmington, Delaware, to expand the present facilities of its Polychemicals Department. This new laboratory will provide sales and engineering services to customers.

The laboratory will have the most modern equipment available for developing technical data on the use and processing of Polychemicals Department products. Its facilities for providing technical services, especially in the field of plastic engineering materials, will be several times those of the present laboratory in Arlington, New Jersey.

Parts of the new laboratory will be equipped especially for study courses on the utilization of plastic engineering materials. Space for exhibits of these materials and products will be provided in a two-story reception area.

Large portions of the laboratory will be equipped for demonstrating new processing methods and for testing and compounding. Floor space: 62,000 sq. ft.

Preliminary work on the site is now under way and construction is expected to be completed late in 1954.

OVER

DU PONT

PROPERTY AND APPLICATION DATA ON THESE VERSATILE ENGINEERING MATERIALS: "ZYTEL," "ALATHON," "TEFLON," "LUCITE."

# NEWS

NO. 5 — 1954

## "Lucite" (*Continued*)

material, with very little light leakage. This property makes the material adaptable to design of parts which utilize "edge-lighting".

### Other Properties

This engineering material is also lightweight (s.g. 1.18) and has excellent moisture-resistance. "Lucite" will not craze or lose its transparency on prolonged outdoor exposure, and it is not affected by sunlight. "Lucite" is readily injection-molded into complex shapes, and is available in a wide range of colors.

For complete information on versatile Du Pont "Lucite" acrylic resin—its properties, applications and methods of processing—fill out the coupon below and mail it today.

## Investigate Du Pont engineering materials in your product development programs

One of the family of these versatile engineering materials is often a key factor in product improvement or new product design.

The wide range of properties available with "Alathon"* polyethylene resin, "Lucite"* acrylic resin, "Teflon"* tetrafluoroethylene resin, and "Zytel"† nylon resin are helping solve industrial design problems.

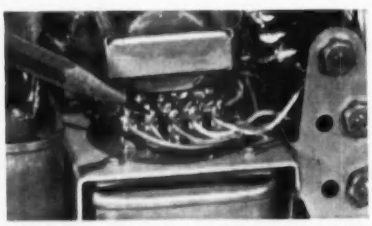
### NEED MORE INFORMATION?

Clip the coupon for additional data on properties and applications of these Du Pont engineering materials.

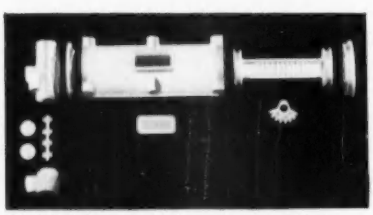
## Wire insulation of Du Pont "Teflon" saves space, speeds soldering

Soldering hook-up wiring where terminals are small and closely fitted can be speeded up considerably by using wire insulated with Du Pont "Teflon" tetrafluoroethylene resin.

Operators can work more quickly with soldering irons because this insulation of "Teflon" is not melted by heat from the hot iron. "Teflon" is useful in the temperature range of from —450°F. to 500°F. There's a space-saving, too. "Teflon", with outstanding dielectric properties, occupies only about ⅛ the space of other types of insulation for hook-up wire.



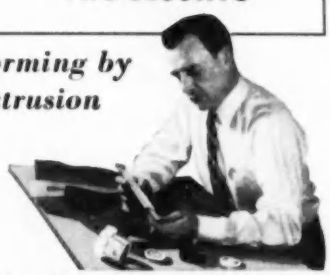
**This inverter control assembly contains miniature wire coated with "Teflon" and easily withstands the ambient temperatures of this assembly (—70°C. to 85°C.).**



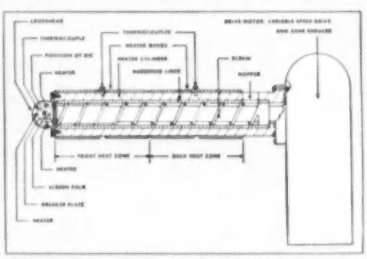
Exploded view of new air pressure windshield-wiper motor molded entirely of Du Pont "Zytel" nylon resin. This motor has exceptionally long service life (9,500,000 cycles without perceptible wear), dimensional stability, and corrosion-resistance. It's mass produced economically by precision injection-molding—needs no surface finishing.

## POINTERS ON PROCESSING

### *Forming by Extrusion*



Du Pont "Zytel" nylon resin, "Teflon", "Alathon" and "Lucite" all can be formed by extrusion techniques. Basically, screw extrusion consists of placing the granulated material in a hopper where it is moved down and forward



**Components of typical screw extruder which might be used to extrude "Zytel" nylon resin.**

along a one-piece heating barrel by means of a rotating screw. The screw then forces the softened material through a die, forming it into shapes such as tubing, rod, bars, and other shapes. This operation varies in a minor degree with the material being processed. Screw extrusion is applicable to "Alathon", "Lucite" and "Zytel".

A typical extrusion machine for "Zytel" nylon resin has these features: (see cut)

1. electrically heated barrel
2. metering type screw
3. screen and breaker plate

**Extrusion of "Teflon"** is best carried out by the ram extrusion method. A reciprocating ram in a cylinder compacts successive charges of "Teflon". The powder is introduced through a hopper at the back position of the ram. Preforming takes place at a cold section of the cylinder and the compacting material moves through the heated section of the cylinder where it is sintered.

Extrusion has certain economic advantages where continuous lengths of material are desired. For example, a coating of "Zytel" nylon resin used as a primary insulation on small wire can be applied at speeds up to 1600 feet per minute with suitable take-off equipment.

E. I. DU PONT DE NEMOURS & CO. (INC.)
Polychemicals Department
Room 178, Du Pont Building, Wilmington 98, Delaware

Please send me more information on the Du Pont engineering materials checked: ☐ "Zytel"; ☐ "Alathon"; ☐ "Teflon"; ☐ "Lucite". I am interested in evaluating these materials for:

NAME _____ POSITION _____

COMPANY _____

STREET _____

CITY _____ STATE _____

TYPE OF BUSINESS _____

*"Alathon", "Lucite", "Teflon" are registered trade-marks of E. I. du Pont de Nemours & Co. (Inc.).
†"Zytel" is the new trade-mark for Du Pont nylon resin.

# Transmission Flywheel Stores Energy While Braking

(*Continued from page* 64)

if the vehicle is not in use, and to retain enough energy to start the engine at any time during this period.

The relationship between the idling speed of the engine and flywheel rotation speed is such that at minimum governed engine revolutions the vehicle remains stationary although in gear with the first clutch engaged. This is effected by gearing the flywheel to the annulus of the accelerating gear train so as to counter the rotation of the sun gear on the input shaft. The planet carrier on the output shaft is thus stationary.

As engine revolutions are increased beyond idling speed this balance is altered, and torque is transmitted to the output shaft. After the vehicle is in motion, the torque of the flywheel applied to the annulus of the accelerating train is passed on to the drive shaft. This power assist by the flywheel continues throughout the period of acceleration and during the upward gear changes of the four-speed transmission which is interposed between flywheel and annulus. At no time does the engine speed exceed its limited maximum revolutions.

Beyond fourth gear, or whenever selected, there is direct drive from the engine to the drive shaft through both disk clutches, and the accelerating gear train and four-speed transmission are automatically disengaged. The flywheel rotates freely, but at a reduced rate determined by the amount of kinetic energy previously imparted to the drive shaft during acceleration.

When braking, the first (accelerating) clutch is disengaged and the drive shaft is geared to the flywheel and engine through the recuperative braking gear train. In this gear train, the engine is connected to the sun wheel, the drive shaft to the annulus, and the flywheel is geared to the planet carrier through the change speed transmission. Since the carrier is rotated by the flywheel in the same direction as the engine and sun, the engine imposes a reverse torque on the drive shaft which tends to retard the vehicle.

A reaction torque is thus created in the carrier by the braking action on the drive shaft (annulus). Since this torque is in the direction of the carrier rotation, it accelerates the carrier and hence the flywheel to which it is geared. Thus the flywheel speed is increased and kinetic energy is recuperated from the drive wheels and shaft of the vehicle as its road speed is correspondingly reduced.

A hydraulic torque monitor, mounted at the rear of the transmission casing, nullifies any gyroscopic action imparted to the casing of the flywheel. It is highly sensitive to torque characteristics and operates damping rams on either side of the casing. Details of this, as well as of the automatic gear selection mechanism and of other operational and construction features, have not yet been revealed since patent applications on them are still pending.

The Gyreacta is still in the experimental stage, and production of this transmission and its practical application in commercial vehicles and for other purposes is not expected for at least another year.

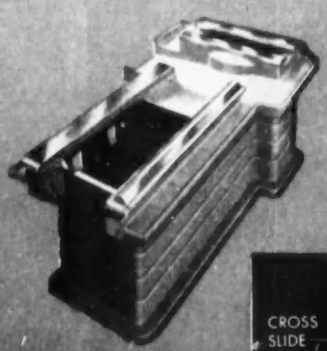
# New!

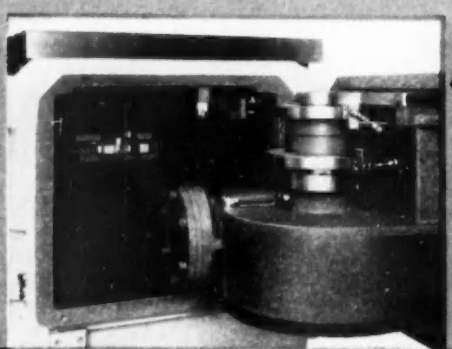

XLO
EX-CELL-O for PRECISION

## Flame Hardened Ways

Rugged—For Tough Jobs. The base is a heavily ribbed nickel iron casting.

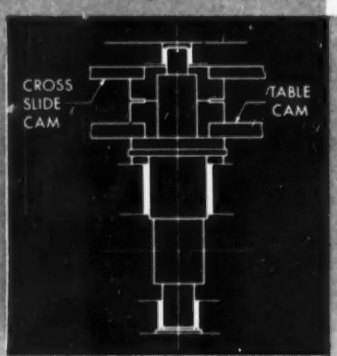
Drawing shows the 3-bearing shaft which supports the cams.





## Cams Changed in *Minutes*

Just open the cam compartment and the cam assembly swings out for quick change of operation. All motors are outside the base.




## Chip Problem Solved

Large chip chute is cast integral in the solid top of the base. There are no openings; chips or coolant cannot enter the base.

# Direct Cam Action

★ NO LEVERS !

IN THE NEW STYLE 312 EX-CELL-O PRECISION BORING MACHINE

★ Fast

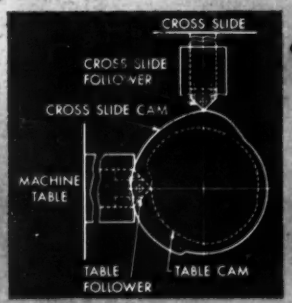
★ Accurate

★ Automatic

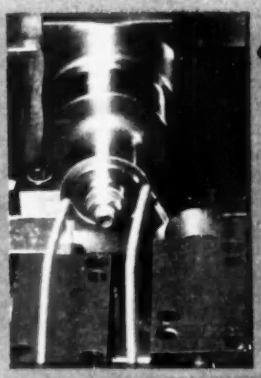
## A New Method by EX-CELL-O

### Direct Cam Action (NO LEVERS) for Sturdier Control

Added to Ex-Cell-O's line of Precision Boring Machines is the new Style 312, for precision contouring, boring, turning, facing and grooving operations.

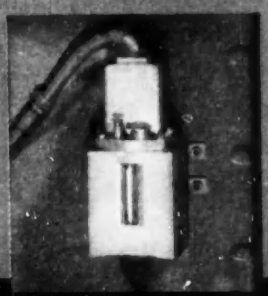



Drawing shows the contouring action. Note that cams act directly on the slides. THERE ARE NO LEVERS. There are separate cams for table and for cross slide, both being on one shaft to insure exact coordination.

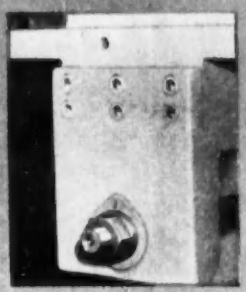


Close-up view of a two-tool contouring operation on an aircraft washer. The part is chucked on the spindle; tools are carried on the cross slide.

Spindle is lubricated permanently.



Ways are lubricated automatically by pump.



**Size Control**

Graduated adjustment, on end of machine, positions the table relative to the work.

## EX-CELL-O CORPORATION

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MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

54-43

**FOR MORE INFORMATION . . .**

contact your Ex-Cell-O representative or write Ex-Cell-O in Detroit for literature.

# Fender Vibration

(*Continued from page 65*)

additional rigidity to offset the frame twisting.

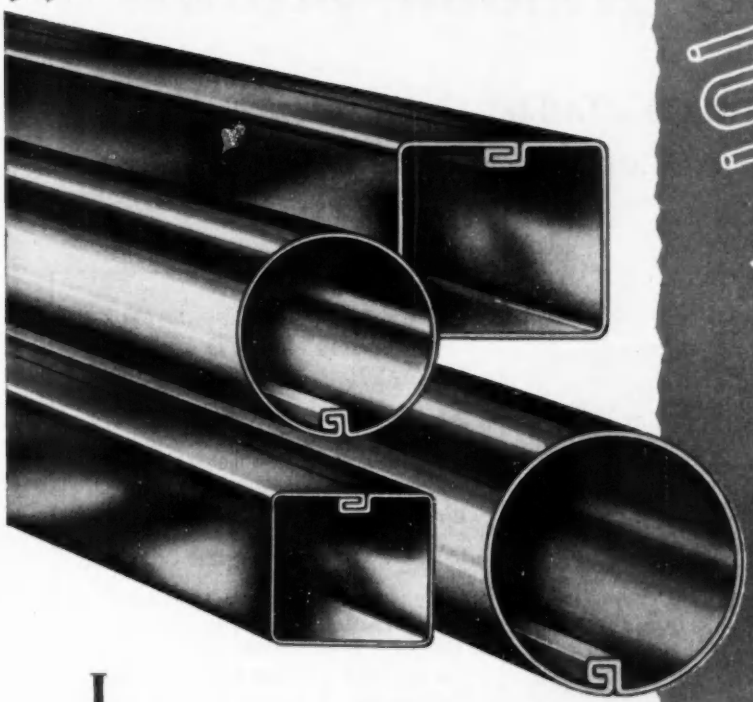
An I-beam truss was fabricated into the test vehicle to prove the practicality of this idea, although such could not be used on the production model. In the process of redesign, little could be done to the exterior appearance, since this had already been frozen by the art section of Packard. Methods used in obtaining the required stiffness were: mating parts welded in preference to using fasteners or metal screws; drawn, flat panels with a generous amount of strengthening ribs used wherever practical; fender edges flanged generously; and fenders modified with a fore and aft rib and rugged trim strip securely fastened in position to aid in stiffening the outer panel.

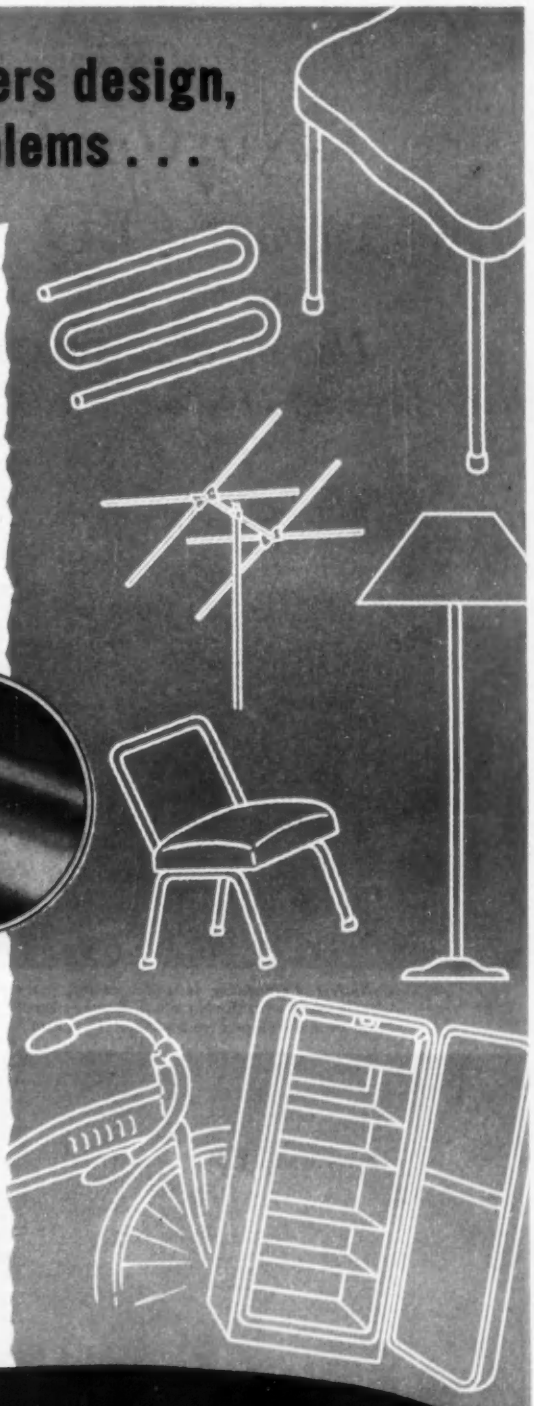
With these modifications incorporated, the desired improvement in lessened fender shaking did not show up in the road test as well as had been indicated on the laboratory torsion test rig. The splashers were then extended so that the entire assembly could be fastened to the frame at several extra points. Tests showed that the addition of approximately 3¾ lb of metal and a few fasteners had, in conjunction with the other modifications, increased the frame's torsional rigidity by 20 per cent.

Road tests repeated with the original instrumentation indicated that the fender shaking had been eliminated. Further endurance runs of 50,000 to 75,000 miles proved that frame loads were transferred to the front-end sheet-metal assembly, since a few localized failures occurred at highly stressed points. Failure points were strengthened by gussets and braces—making the assembly even more rigid.

The same instruments used to locate the cause and evaluate the redesign progress were again used to prove complete elimination of the original trouble. Changes were then incorporated in assemblies destined for production.

# Roll Formed Tubing answers design, production and cost problems . . .





Less expensive Roll Formed Lockseam Tubing cuts costs on all tubing jobs. In many cases it does a better job than more expensive tubing. Lockseam Tubing can be bent as easily as other types. Your tubing is delivered ready for use. Send us your blueprints for steel or aluminum Lockseam Tubing. Let us prove that Roll Formed can help you produce a better product at less cost. For complete details on Roll Formed tubing and special shapes write for Catalog 1053. It tells the complete Roll Formed story.

ROUND SIZES — LOCKSEAM TUBING

| Section No. | Wall Thickness | O.D. | Section No. | Wall Thickness | O.D. |
|---|---|---|---|---|---|
| 2172 | .018 | ½" | 2096 | .025—.030—.035 | 1" |
| 2173 | .018 | ⅝" | 2020 | .025 | 1⅛" |
| 2103 | .025—.030 | ¾" | 2030 | .030—.035—.040 | 1¼" |
| 2174 | .025—.029—.032 | ⅞" | 2176 | .030 | 1½" |

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*More proof of how*

# Norton G Bond wheels boost O.D. grinding profits

## *Users praise* "TOUCH of GOLD" *performance that steps up production rate and quality while cutting costs*

***Cylindrical Grinding*** is faster, easier, more profitable when wheels made with the Norton G Bond — most efficient vitrified bond ever developed — add the "Touch of Gold."

### *Users' Reports on Cylindrical Grinding*

***Job:*** Assorted small diameter stock.
***Report:*** G Bond wheel gave 50% more pieces per dressing, with greatly improved finish.

***Job:*** Rear axle pinions, SAE 4120 stock.
***Report:*** Grinding to .001" limits, G Bond wheels removed stock faster, more uniformly. Gave more pieces per dress, with less spark-out time.

***Job:*** 3" diameter formed roll, hard steel.
***Report:*** Cooler cutting, crush-trues nicely, holds form. Best wheel ever used.

***Job:*** Hardened steel raceways of ball bearing "inners."
***Report:*** Ground 60 of the .075" radius grooves per dressing, compared to 25 with previous wheel. This G Bond wheel, also used on critical shoulder job, held form and gave superior finish.

*Centerless Grinding* benefits by the G Bond's unique ability to hold each abrasive grain just long enough for maximum cutting action — an important "Touch of Gold" advantage.

## *Users' Reports on Centerless Grinding*

*Job:* ¾" diameter x 2" textile spindles, spindle steel.
*Report:* G Bond wheels produced better form and finish than any other wheels. Gave 50% more pieces per dressing on both rough and finish grinds. Also eliminated previous distortion of spindles due to overheating.

*Job:* Removing up to .010" per pass on varied steel parts.
*Report:* Dressing required only once every 4 hours, instead of every 40 minutes. Best general purpose wheel ever used on our centerless machines.

*Job:* Thru-feed ½" diameter bar stock, stainless steel.
*Report:* Cut faster and freer, held size better and gave better finish than previous standard wheel.

*Job:* ½" diameter shafting, drill rod and stainless steel.
*Report:* G Bond wheel gave 16 hours longer wheel life and produced much better finish.

In O.D. grinding, as in many other precision and semi-precision grinding operations, first-time users of G Bond wheels are quick to recognize that here, at last, are wheels that will outperform any others they ever used. Advantages like these are the reasons why:

***Cooler cutting action . . . faster stock removal . . . better finish . . . more pieces per dressing . . . longer wheel life . . . easier dressing, with less wear on diamond or on crushing roll.***

Added up, all these new advantages mean valuable production economies and improvements in your product. That's why G Bond users have been glad to show their appreciation — with a steady stream of endorsements like those reproduced here.

## *Your Norton Distributor*

is ready with proof of how G Bond wheels can add the work-speeding, profit-increasing "Touch of Gold" to your own cylindrical or centerless grinding jobs. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified 'phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. W-1575

*Making better products . . . to make other products better*

NORTON

**and its BEHR-MANNING division**

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

# Automatic Controls Increase Engine Applications

(*Continued from page 55*)

matic controls for oil drilling operations, etc.

Fighting frost in agricultural areas is one of the new wrinkles. Here an engine-driven propeller, mounted on a tower, drives air at this higher level toward the ground. Fire fighting equipment is available, meeting the requirements of insurance underwriters, for fire pumps in industrial plants, airports, warehouses, etc. Gas and oil pipeline booster stations have been found most effective in many uses. Oil field pumping engines are especially suited to the application of automatic controls, making it possible for a single operator to handle a whole field of engines, in interrupted cycling operations.

One of the most valuable applications of robot-controlled stand-by units is for automotive manufacturing plants, particularly those located outside city limits and in small communities. In the event of power failure these sets unfailingly provide power for emergency lighting, operation of ventilating units, and other emergency services required for the safety of personnel and equipment. Large plants located in urban areas can also employ such stand-by plants effectively for emergency use in case of fire or disaster, when other power sources fail.

Most control systems, according to the manufacturer, require little service or adjustment except for occasional cleaning of contact points and keeping all connections clean and tight. The main thing is to keep the starting batteries well charged and in good operating condition.

Since engines that stand idle for long periods of time may be hard to start, they should be test run periodically to circulate the lubricant and warm the water sufficiently to remove condensation. A 15-minute run usually is sufficient for this purpose, although the time may vary with different makes and types of engines.

Shown with this article are several recent applications of automatically-controlled stand-by power plants. One of the illustrations shows an automatic starting Murphy Diesel, 127-kw generator set, installed in the Pan-American Grace Airways (Panagra) Airport at Limatambo Airport outside Lima, Peru.

A smaller Murphy Diesel, Model ME-6, 76-kw, 50-cycle, automatic starting generator set, owned by Sears, Roebuck & Co. at Caracas, Venezuela, also is illustrated. It serves as a stand-by unit, and has been reportedly running several times a day because of daily power failures in the area.

Although only certain applications of stand-by equipment will be used in automotive plants, the important fact is that robot controls open entirely new fields for commercial engines, and mark new outlets for engines built by automotive producers. A relatively new field and one well worth intensive exploitation, it promises additional business for producers of Diesel, gasoline, gas, and LPG engines in sizes ranging from the smallest to the largest built commercially.

## SHORTIES

In 1943, a typical aircraft manufacturer had one technician for every 92 employees. The proportion today is one out of every 11 employees.

•

With afterburners the jet engines in an all-weather interceptor have power equal to 150 average sized automobiles.

•

Last year, over 50 per cent of the aircraft built by a major U. S. manufacturer were based on designs originated in 1945 and 1946.

•

Increase in motor vehicle registrations in the U. S. in 1953 was more than double the increase of 1952. Total registration of all types was 56,279,864, an increase of more than three million vehicles over 1952. Of the 1953 total, 46,460,094 were passenger cars, 9,575,519 were trucks and 244,251 were buses.

•

It is estimated that motor vehicle travel on roads and streets last year was 540 billion vehicle miles, a gain of 5.5 per cent over 1952.

•

It takes more than 4000 sq ft of cold rolled sheet steel to make 100 automobile roofs.

•

While every 16 persons in the U. S. have a truck at their service, one truck in Russia must service about 750 people, and in China it must cope with the needs of 9000 persons.

•

The Federal postal service owns about 19,000 trucks and leases 28,000 more.

•

Today, only one-third of U. S. active military aircraft are jet-powered. By mid-1957, the Air Force, Navy, and Marine air forces will have more than 20,000 jet aircraft.


You can help us place a copy of this *new* book in your hands. Please give us your name and address. We'll do the rest. It will be *mailed* without cost to you—no intrusion on your time.

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STEEL CORPORATION — *Pittsburgh*

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Name_____
Title_____
Company_____
Address_____

# CALENDAR

## OF COMING SHOWS AND MEETINGS

SAE West Coast Meeting, Los Angeles, Calif. ..... Aug. 16-18

National Fluid Power Association, fall meeting, Hotel Commodore, New York, N. Y. ..... Sept. 7-9

Society of British Aircraft Constructors, exhibition and flying display, Farnborough, England Sept. 7-12

ASME Fall Meeting, Schroeder Hotel, Milwaukee, Wis. ... Sept. 8-10

SAE National Tractor Meeting, Hotel Schroeder, Milwaukee, Wis. Sept. 13-16

First International Instrument Congress and Exposition, Philadelphia, Pa. ..... Sept. 13-24

Fourth European Machine Tool Exhibition, Milan, Italy ..... Sept. 14-23

National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J. ..... Sept. 15-17

Society for Experimental Stress Analysis, annual meeting and exhibition, Bellevue - Stratford Hotel, Philadelphia, Pa. .. Sept. 21-23

ASME Annual Engineering Conference, Statler Hotel, Los Angeles, Calif. ..... Sept. 27-30

National Industrial Packaging and Materials Handling Exposition, Chicago, Ill. ..... Sept. 28-30

Association of Iron and Steel Engineers, annual convention and exposition, Cleveland, O. Sept. 28-Oct. 1

SAE National Aeronautic Meeting, Statler Hotel, Los Angeles, Calif. ..... Oct. 5-9

Paris Automobile Show, France. Oct. 7-17

National Conference on Industrial Hydraulics, Sheraton Hotel, Chicago, Ill. ..... Oct. 14-15

SAE National Transportation Meeting, Sheraton-Plaza Hotel, Boston, Mass. ..... Oct. 18-20

National Safety Congress and Exposition, Chicago, Ill. ..... Oct. 18-22

International Motor Show, Earls Court, London, England ... Oct. 20-30

American Gear Manufacturers Association, semi-annual meeting, Edgewater Beach Hotel, Chicago, Ill. ..... Oct. 24-27

National Lubricating Grease Institute, annual meeting, Mark Hopkins Hotel, San Francisco, Calif. ..... Oct. 25-27

SAE National Diesel Engine Meeting, Statler Hotel, Cleveland, Ohio ..... Oct. 26-28

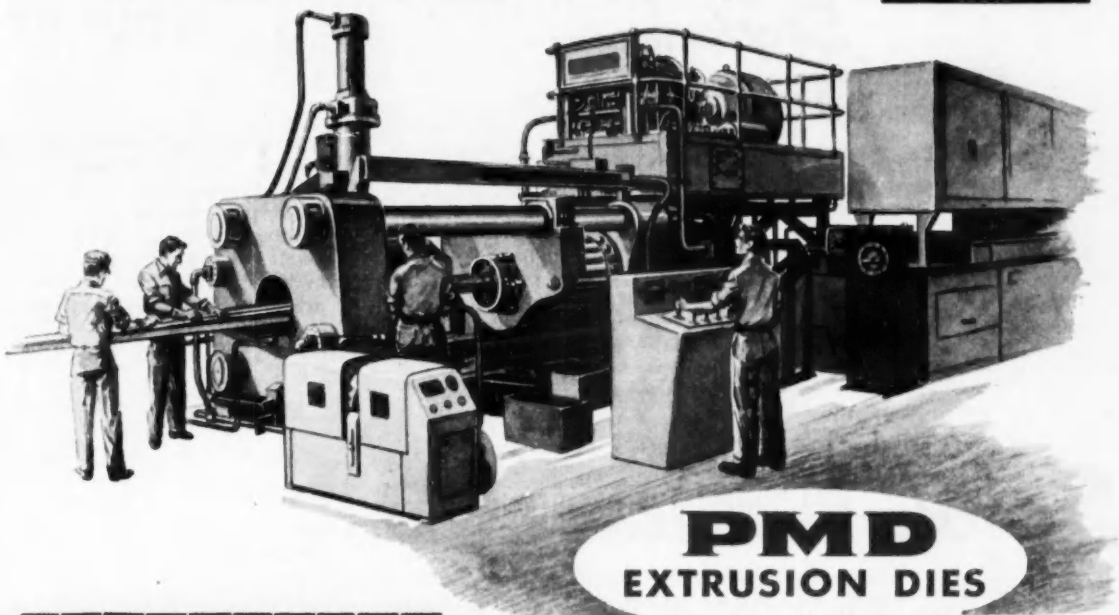
American Society of Body Engineers, annual technical convention, Rackham Memorial Bldg., Detroit, Mich. ..... Oct. 27-29

National Metal Congress and Exposition, International Amphitheatre, Chicago, Ill. ..... Nov. 1-5

SAE National Fuels and Lubricants Meeting, Mayo Hotel, Tulsa, Okla. ..... Nov. 4-5

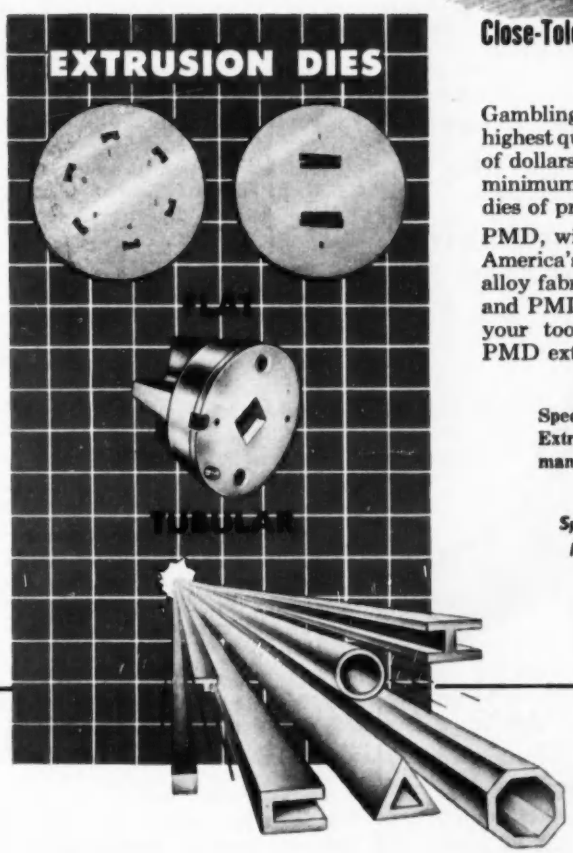
Pan-American Road Race, Mexico Nov. 19-23

# YOUR EXTRUSION PRESSES are no better than your DIES!



## PMD EXTRUSION DIES

**Close-Tolerance Extrusions • Trouble-Free Production Runs Longer Service Life**




Gambling expensive man-hours on anything less than the highest quality tooling, can result in cost penalties of thousands of dollars in lost production! Top production results, with a minimum of tooling expense—can be had only with extrusion dies of precision quality and long service life!

PMD, with a proved record of specialized service, is one of America's largest independent producers of tooling for light alloy fabrication. Design and engineering service is available, and PMD specialists will work with you closely in planning your tooling requirements. PMD facilities are complete. PMD extrusion dies are guaranteed! Write or phone today!

**Specialists in the design and production of non-ferrous Extrusion Dies (flat and tubular), Die Casting Dies, Permanent Molds and Piston Cores, Shell Molding Patterns.**

•

***Special Machines:***—Coilers for Tubing • Trim Dies
Molding Devices (permanent mold) • Billet Molds
D. C. Casting Units

**PERMANENT MOLD DIE COMPANY, INC.**
2271 East 9 Mile Road, Hazel Park, Mich.
SLocum 7-8100

## ON OUR WASHINGTON WIRE

**Stronger Government support is seen for a plan to operate U. S.-owned vehicles from central motor pools in many cities. Recent estimates of the amount these pools would save run from $5 million to $10 million a year. Congress must act before the pools can be created.**

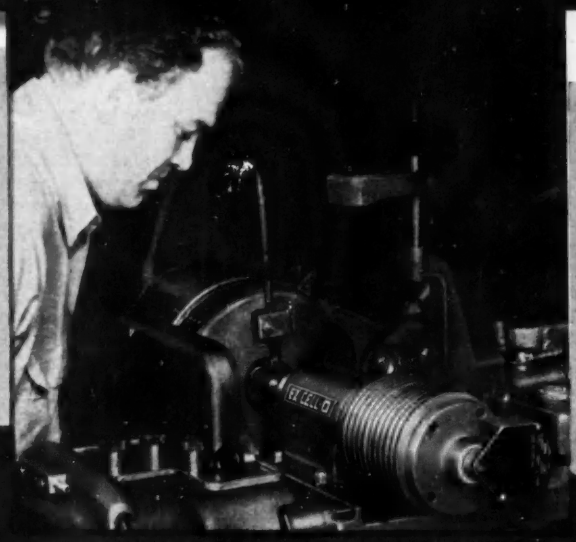
Internal Revenue Service has ruled that only a genuine "company car," and not a "demonstrator," is eligible for depreciation on an automobile dealer's tax return. The ruling affects tax returns prepared by car dealers in every state.

**Twenty-two additional Government-owned non-secret technological atomic energy patents will soon become available for use by industry. Descriptions of the patents have been turned over to the U. S. Patent Office for registry by the Atomic Energy Commission.**

Government will grant fast tax depreciation allowances in an effort to boost aluminum forging capacity by 27 pct by the end of 1955. ODM calls on producers to raise aluminum forging capacity by 108,250,000 lb above present capacity of 395,900,000 lb.

**General Service Administration reports that it is saving up to $1 million each year on tires on its civilian vehicles by recapping the wornout casings.**

Better measurement of business growth may not be voted by Congress this year. Economy-minded legislators talk of sidetracking a White House bid for about $13 million for taking the long-postponed business census next year.



Grinding small holes with an Ex-Cell-O 25,000 RPM High Frequency Motorized Spindle

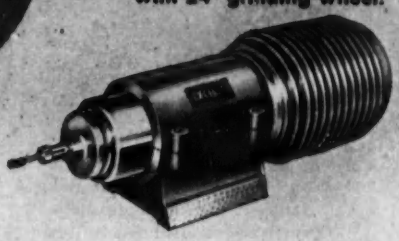
# PRECISION SPINDLES

## Built for Your Work

Single-body, belt-driven internal grinding spindle.

Double-body, belt-driven internal grinding spindle.

25 hp heavy duty precision spindle with 24" grinding wheel.



25,000 rpm high frequency inbuilt motor spindle.

Totally enclosed inbuilt motor surface grinder spindle.

Precision inbuilt motor spindle for cutter grinder.

Heavy duty motorized precision spindle available up to 20 hp

**Get the most from your precision grinding operations by using the Ex-Cell-O Spindle that's made especially for the job.**

Ex-Cell-O Precision Spindles have long been the original equipment choice of leading grinder manufacturers. They are rigid and smooth-running. For high precision work they are fitted with standard Ex-Cell-O Precision Ball Bearings; for slower speeds and heavier cuts they are equipped with heavy-duty Ex-Cell-O Precision Ball Bearings. They require no lubrication or adjustment. Phone your Ex-Cell-O representative or write to Ex-Cell-O in Detroit today for catalog 25962 listing hundreds of standard grinding spindles.

53-32

XLO

EX-CELL-O Air PRECISION

# EX-CELL-O

## CORPORATION

DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

# Manifolds

(*Continued from page* 71)

Manifolds are located in the fixture under matching flanges and on foundry lugs, and centralized between center port bosses. This machine, like the Cross used on the intake manifolds, is equipped with a dust control system and an oscillating chip conveyor.

Using 12-in. diameter carbide tipped cutters, the mounting flanges of the manifolds are milled at the second station of the machine. At the next station, a 14-spindle drill head is used for a variety of holes. Gaging equipment is incorporated in the station for proper control of quality. A two-spindle milling head is used at station 4 to finish mill the crossover pipe joint face of both parts and muffler pipe face of the right-hand manifold. Successive operations include counterboring, chamfering, tapping, and further drilling and milling to finish-machine the component. Conventional speeds and feeds are used throughout.

Upon leaving the transfer equipment, the parts are hung on an overhead conveyor. Deburring operations are carried out with air driven portable grinding equipment before the workpiece is washed. Indicator gages, plug gages, feeler gages, master ring gages, flush pin gages, bar gages, and some special type gages are used for the final inspection of the finished manifold.

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*This installment is the last in the series of three articles devoted to machining and other operations on Mercury engine components at the Ford Cleveland Engine Plant. Part I and Part II appeared in the April 1 and June 1 issues of* AUTOMOTIVE INDUSTRIES.

## LITERATURE

TENTATIVE SPECIFICATIONS FOR CORROSION-RESISTING CHROMIUM AND CHROMIUM-NICKEL STEEL WELDING RODS AND BARE ELECTRODES, *published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, $0.25.* These specifications cover stainless steel filler metals for use with the inert-gas metal-arc process. Issued jointly by the ASTM and the AWS, they include corrosion-resisting chromium and chromium-nickel steel welding rods and bare electrodes. Thirteen classifications of filler metal are established by these specifications, including all the commonly used materials. This involves, among others, the 18-8, 25-12 and 25-20 chromium-nickel steels as well as the 5, 12 and 16 per cent straight chromium steels.

# METALS

(*Continued from page 96*)

who were hard hit by cutbacks in defense expenditures with some concerns still on curtailed operating schedules.

Undoubtedly copper is in better shape statistically than other nonferrous metals. U. S. consumption as a whole is much better than was expected early in the year and European demand at the established 30 cent price has confounded the experts.

But there is little belief that the market price will advance, barring a change in the international situation. Much of the price stability of copper arose from prompt action of the producers in cutting back production when it was critically high. Output from now on is likely to increase measurably. Chilean production has been raised 50 per cent, from 20,000 to 30,000 metric tons per month. Several important new domestic mines will start to grind ore in the second half of the year, which will add over 12,000 tons a month to supply by the end of 1954. And there has been a sharp increase in supply of scrap copper recently for the custom smelters, which is averaging about 13,500 tons a month. This results from a declining demand for this material from abroad. Quite definitely a squeeze in copper is not likely to come in the foreseeable future.

## Improved Zinc Statistics

For the first time in 1954 the monthly zinc statistics were really cheerful. Shipments of shale zinc in June were the highest for more than a year with a total of 80,293 tons. Domestic consumption was up 10,400 tons and shipments abroad and for Government account were also up sharply. At the end of the month top heavy stocks of metal had been reduced 8800 tons.

Settlement of the wage controversy in the steel industry which assured no work stoppage for the galvanizers resulted in improved demand for Prime Western grades. The price was firm at 11 cents per lb with the trade anxiously awaiting final word from Washington regarding stockpile objectives and tariff action. Strong pressure is being exerted both ways on the latter, with the State Department opposing any increase in tariffs while western congressmen are urging a substantial rise in rates.

## Lead Market Quiet

Demand for lead has been moderate. The trade has not yet recovered from the shock it received when the Government refused to pay the then market price of 14¼ cents per lb for metal offered for stockpiling. This rebuff resulted in an immediate weakening in the price to 14 cents, with caustic comments from producers on the Government's strange action if its purpose was, as announced, to benefit the lead producers.

## Quicksilver Soars

The phenomenal strength in the quicksilver market has the trade sorely puzzled. By mid-July the metal had advanced to $290 per flask. Earlier in the year, the price was about $185; before Korea it was approximately $75.

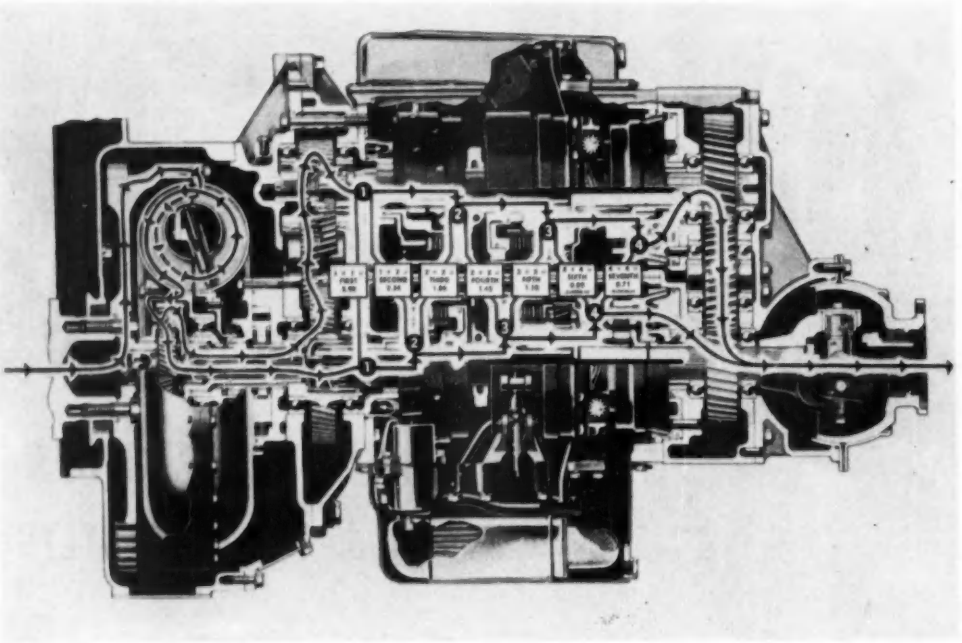
The market was strengthened by the Government's announcement that it would pay $225 per flask through December, 1957. The purpose was to stimulate domestic production and lessen dependence upon imports of Spanish and Italian quicksilver.


# THE HILL ACME COMPANY

**ACME MACHINERY DIVISION** • 1209 W. 65th St., Cleveland 2, Ohio
ESTABLISHED 1882

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING AND POLISHING MACHINES
HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES

# Operation of the Twin Hydra-Matic



SUPPLEMENTING the article (see AUTOMOTIVE INDUSTRIES, April 1, 1954) describing features of the Twin Hydra-Matic transmission announced by GMC Truck and Coach Division of General Motors Corp., the illustration reproduced here provides more mechanical detail.

Band and clutch applications for each of the maneuvers described in the earlier article are shown on the chart.

BAND AND CLUTCH APPLICATION
TWIN HYDRA-MATIC—MODEL HDMA-660

| | Lower Unit | | | | Upper Unit | | | |
|---|---|---|---|---|---|---|---|---|
| | Front | | Rear | | Front | | Rear | |
| | Band | Clutch | Band | Clutch | Band | Clutch | Band | Clutch |
| Neutral—Truck Standing, Engine Not Running | R | R | A | R | R | R | A | R |
| Neutral—Truck Standing or Moving, Engine Running | R | R | R | R | R | R | R | R |
| First Speed—Control Lever in DR | A | R | A | R | A | R | A | R |
| Second Speed—Control Lever in DR | R | A | A | R | A | R | A | R |
| Third Speed—Control Lever in DR | R | A | A | R | R | A | A | R |
| Fourth Speed—Control Lever in DR | A | R | R | A | R | A | A | R |
| Fifth Speed—Control Lever in DR | A | R | R | A | A | R | R | A |
| Sixth Speed—Control Lever in DR | R | A | R | A | A | R | R | A |
| Seventh Speed—Control Lever in DR | R | A | R | A | R | A | R | A |
| Reverse—Control Lever in R | A | R | R | R | A | R | R | R |

R = Released.
A = Applied.

• • •

## GM Holding Division Marks 25th Year

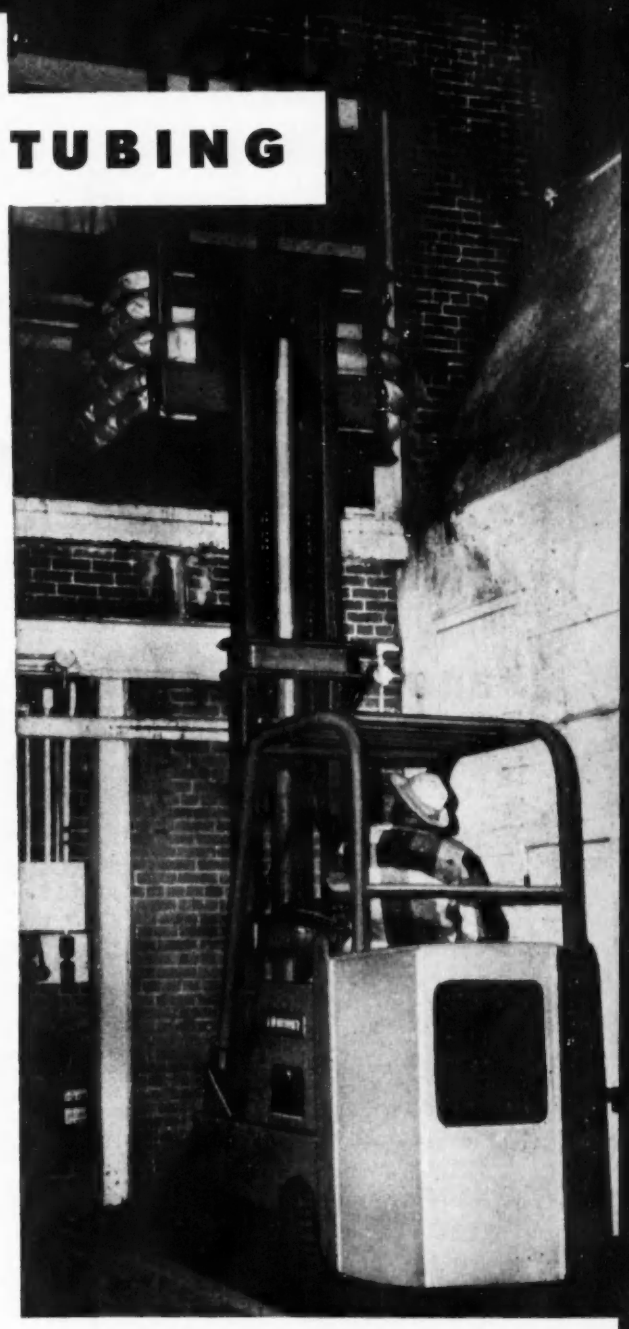
Business sessions, which included a talk by Harlow H. Curtice, president of General Motors Corp., and William F. Hufstader, GM vice-president, highlighted the three-day celebration of the 25th anniversary of the founding of the Motors Holding Division of GM in Detroit last month. Since the Motors Holding Div. was established in 1929, more than 2000 persons have been given financial assistance by GM in setting up dealerships.

# SHELBY SEAMLESS TUBING

## puts the

# LIFT

## IN LIFT TRUCKS



● The Towmotor is one of the most rugged top-performing lift trucks in the country. And the lift mechanism of the Towmotor features a standard mast which provides the highest free lift—25½"—in the industry. The model shown here has a 6000 lb. capacity at 24" load center. Key to this powerful, fast-hoisting action is the hydraulic hoist cylinder—the assembly that puts the "lift" into every load hoisted by the Towmotor. That hoist cylinder is fabricated from Shelby Seamless Mechanical Tubing.

Shock-absorbent Shelby Seamless Tubing combines to the highest degree the desirable qualities of strength, safety and workability. It is uniform throughout, dimensionally accurate, and possesses excellent machining and superior welding properties.

Shelby Seamless is produced to exacting standards by the world's largest manufacturer of tubular steel products. It is available in a wide range of diameters, wall thicknessess, various shapes and steel analyses. Please feel free to call on our engineers at any time. They will be glad to submit recommendations based on a study of your particular requirements.

**All Shelby Seamless Tubing is pierced from solid billets of uniform steel. This is the one manufacturing method that assures absolute uniform wall strength.**


NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
*(Tubing Specialties)*

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

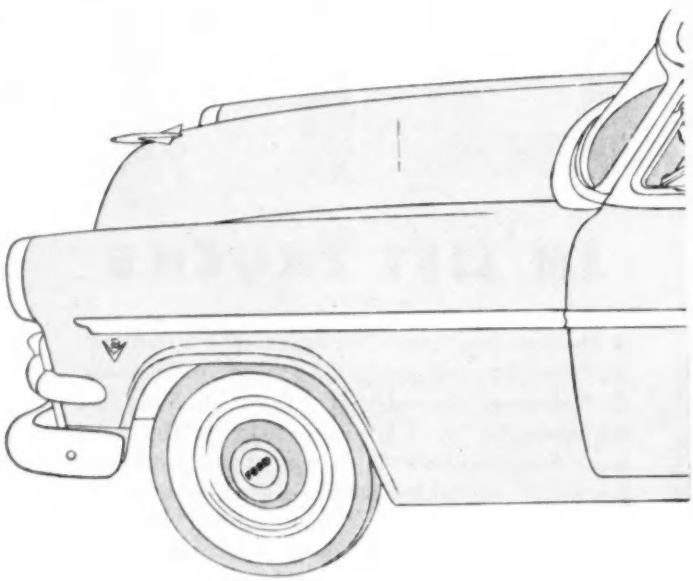
**SHELBY SEAMLESS MECHANICAL TUBING**

4-1050

UNITED STATES STEEL

# Ford USES

## for black convertible tops of highest colorfastness that face sun and storms... and never fade!



Ford drives home the big selling point about Coloray—its almost incredible colorfastness! Fully 75% of this year's Ford convertible tops*—and 50% of the Lincolns—are 100% colorfast Coloray Black.

In black and all colors, Coloray offers unexcelled *all-around* fastness — to sunlight and weathering — to washing, cleaning, perspiration, crocking. For Coloray is the *original* solution-dyed fiber, created by Courtaulds . . . the company that developed viscose rayon. Its tenacious grip on color has been proved in tests and in performance . . . year after year, since 1938.

British-born Coloray is now produced here for a huge and hungry market . . . covering automobiles, all kinds of apparel, home furnishings, industrial items. And Coloray is economical . . .

**Coloray and white rayon staple are produced in Courtaulds' new plant at Le Moyne, Alabama. 15 basic colors are available in these deniers and staple lengths: 1½ denier—1-9/16" staple, 3 denier—2" staple.**

*For further information, write Fabric Development Dep't:*

**COURTAULDS** *first name in man-made fibers, first name in solution-dyeing.*
(Alabama) Inc., 600 FIFTH AVENUE, NEW YORK 20, N. Y. • GREENSBORO, N. C. • LE MOYNE, ALABAMA

# COURTAULDS' Coloray T.M.

## SOLUTION-DYED RAYON STAPLE


brings the **most** colorfast and richest color into the volume-priced field . . . in line with the American idea of making the better things in life available to the most people. Ford convertibles, for example.

Watch the Fords go by—with Coloray on top! Your product, too, can move faster with supremely fast Coloray.



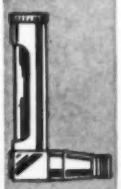

"Outside fabric. Ford topping by Acme Backing Corp. Lincoln topping by Hauntz Auto Fabric Co.

# LOOK TO THE LEADER . . . FOR LUBRICATING DEVICES

# GITS

## 40 YEARS' LEADERSHIP

Yes, for 40 years GITS has been setting the standard for industry . . . solving tough lubricating problems . . . earning the confidence of manufacturers . . . it's the reason people say, "Call GITS first".



## LOW COST

Yes, GITS oil cups can do a complete lubricating job for you . . . prolonging bearing life, reducing maintenance costs, cutting down-time, boosting production . . . and GITS oil cups cost so little.

## WORLD'S LARGEST SELECTION

Yes, only GITS can offer you such a wide range of standard stock sizes. From *just one* source you can get *all* lubrication devices in *any design* for *any purpose.*

## CONSISTENT TOP QUALITY

Yes, GITS is known for uniform quality in design, materials and machining . . . this means constant, dependable performance for you. Inferior products can cost you time and money. Demand the best . . . get GITS.

**Oil Hole Covers • Oil Cups • Grease Cups • Bottle Oilers • Gauges • Gravity-Feed • Wick-Feed**
**Constant Level • Vibrating Rod Styles • Threaded or Drive-Type • Elbow or Straight**

**GITS BROS. MFG. CO.**

**1870 S. Kilbourn Ave. Chicago 23, Ill.**

**Write today for Free Catalog No. 60A. Use it as your handy reference for lubricating devices.**

# How Heat-Treatment Affects Alloy Steels

*This is the fourth of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.*

There are in general five different forms of heat-treatment used with hot-rolled alloy steel. These treatments modify the mechanical properties of the steel to suit the end use. Basically, heat-treating may be defined as an operation or series of operations involving the heating and cooling of steel in the solid state to develop the required properties.

The five forms of treatment mentioned above, as applied to constructional alloy steels, are discussed in the following paragraphs:

**(1) QUENCHING AND TEMPERING** usually consists of three successive operations: (a) heating the steel above the critical range, so that it approaches a uniform solid solution; (b) hardening the steel by quenching it in oil or water; and (c) tempering the steel by reheating it to a point below the critical range in order to effect the proper combination of strength and ductility.

**(2) NORMALIZING** is a form of treatment in which the steel is heated to a predetermined temperature above the critical range, after which it is cooled slowly to below that range in still air. The purpose of normalizing is to promote uniformity of structure and to alter mechanical properties.

**(3) ANNEALING** consists of heating the steel to a point at or near the critical range, then cooling at a predetermined rate. Annealing is used to develop softness in steel, to improve machinability, to reduce stresses, to improve or restore ductility, and to modify other properties.

**(4) SPHEROIDIZE-ANNEALING** is the prolonged heating of steel at an appropriate temperature, followed by slow cooling to produce a globular condition of the carbide. This treatment produces a structure which may be desirable for machining, cold-forming or cold-drawing, or for the effect it will have on subsequent heat-treatment.

**(5) STRESS-RELIEVING** is the process of reducing internal stresses by heating the steel to a temperature below the critical range and holding for a time interval sufficient to equalize the temperature throughout the piece. The object of this treatment is to restore the elastic properties of the steel, or to reduce stresses that may have been induced by machining, cold-working, or welding.

Bethlehem metallurgists have had long experience in all methods of heat-treating. They understand the possibilities and limitations of each method with respect to various alloy steels. These men will be glad to give advice or help you with any problems concerning heat-treatment. Always feel free to ask for their services.

And call on Bethlehem, too, for the full range of AISI standard alloy steels, as well as special-analysis steels and all carbon grades. We can meet your needs promptly.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

**BETHLEHEM ALLOY STEELS**

BETHLEHEM STEEL

# *Mr. and Master Mechanics*

This is Dad's special day . . . Family Open House at Lodge & Shipley . . . time when he can show off to his youngster. Perhaps making lathes doesn't seem as thrilling now to the boy as being a baseball star, but Son's impressed with the "wonderful" lathes . . . and Dad's beaming.

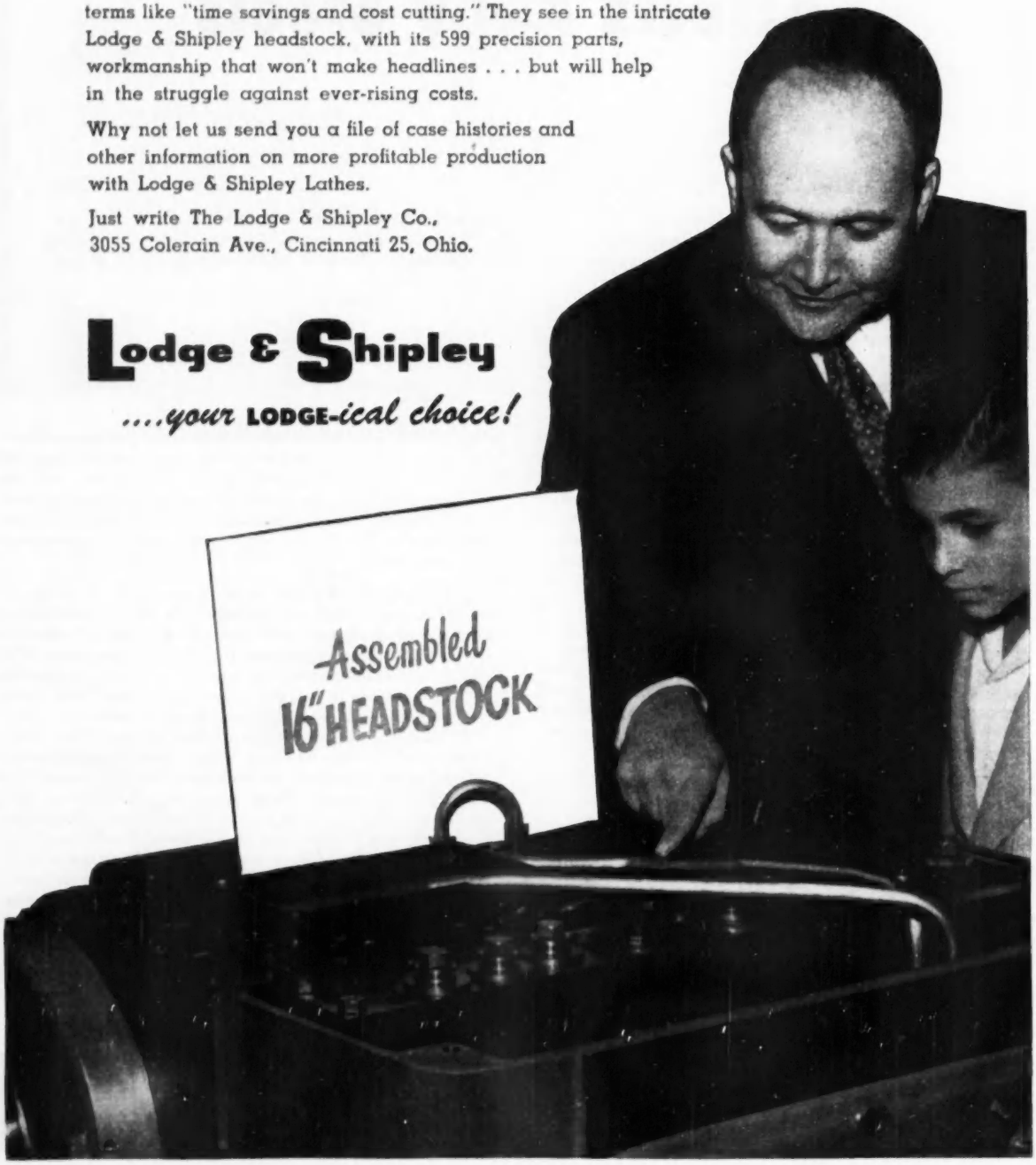
The youngster is like the thousands of Lodge & Shipley lathe users who for decades have been impressed by the results of craftsmanship like his Dad's. They translate the boy's words of wonder into more specific terms like "time savings and cost cutting." They see in the intricate Lodge & Shipley headstock, with its 599 precision parts, workmanship that won't make headlines . . . but will help in the struggle against ever-rising costs.

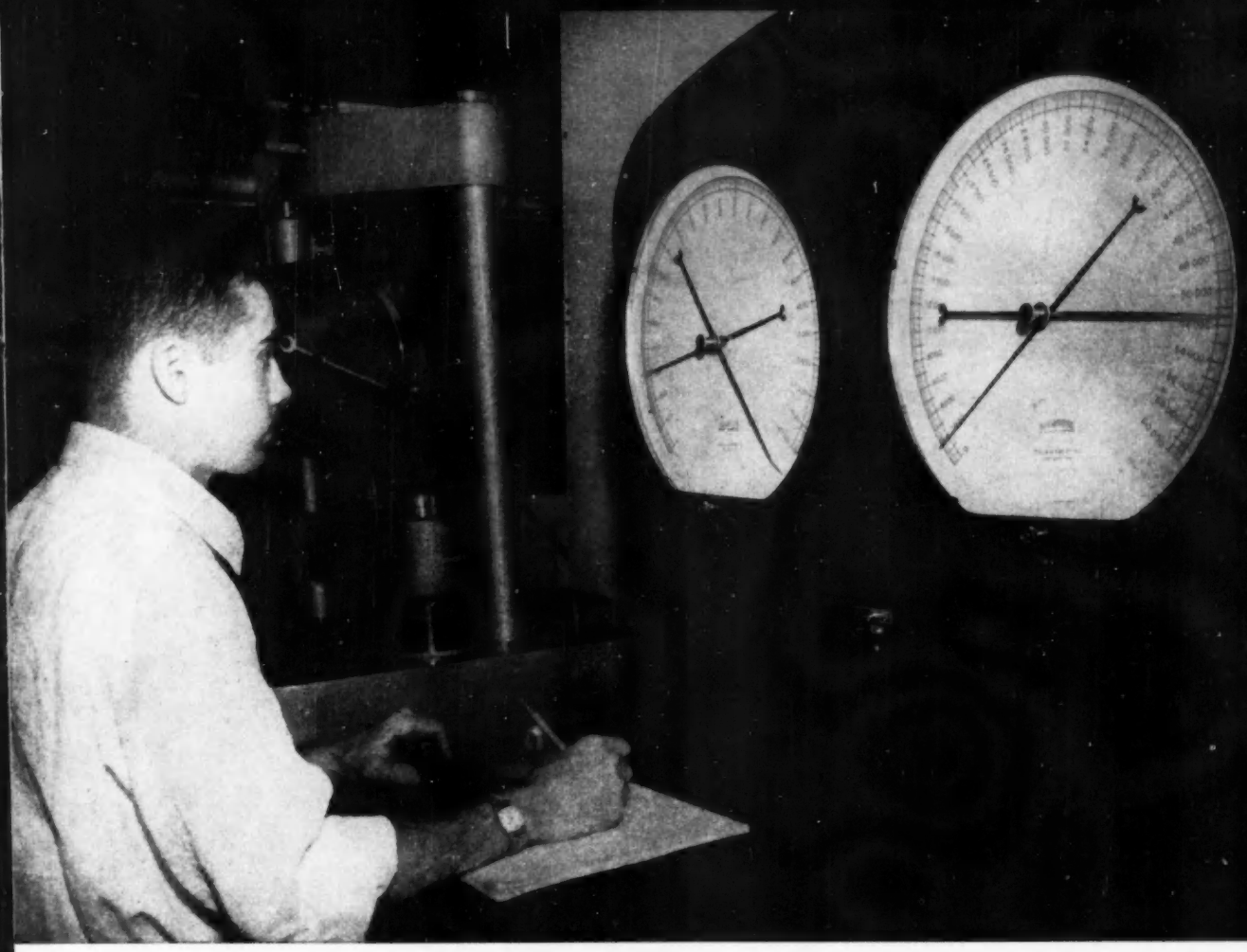
Why not let us send you a file of case histories and other information on more profitable production with Lodge & Shipley Lathes.

Just write The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

**Lodge & Shipley**

*. . . . your* **LODGE**-*ical choice!*





# Baldwin's low-cost 60-H makes testing easy for the University of Pittsburgh

For testing parts of naval aircraft the University of Pittsburgh's Engineering Research Division uses the Baldwin 60-H. Also secondary load measuring devices such as dial type dynamometers and tension bars with SR-4 strain gages are calibrated by this testing machine.

Pitt chose the Model 60-H for testing economy and simplicity. And they've found this low-priced, easy to operate machine enables engineering students to do most of the test work. Its convenient control system, many automatic safety features and simple maintenance make testing at Pitt an easy and trouble-free operation.

The Baldwin Model 60-H gives the University of Pittsburgh *all* these testing benefits.

1. Simple operation makes it easy for engineering students to do test work.
2. The machine meets *all* requirements at low cost.
3. Accuracy of load measurements is well within laboratory requirements.
4. Separate frames for loading structure and indicator prevent transmission of shock when test specimens break.
5. Scale ranges of 0-12,000 lbs. and 0-60,000 lbs. are exactly suited to stress ranges of the test work.

Like the University of Pittsburgh, you can have *all* these benefits with the Baldwin Model 60-H. You'll learn that Baldwin designs testing machines to give outstanding performance. For more information about the Baldwin Model 60-H and other testing equipment, write now to Dept. 2504, Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

*TESTING* BALDWIN BLH LIMA-HAMILTON *HEADQUARTERS*

**BALDWIN-LIMA-HAMILTON**

*General Offices: Philadelphia 42, Pa. • Offices in Principal Cities*
*In Canada: Peacock Bros., Ltd., Montreal, Quebec*

## Selling is only half the job

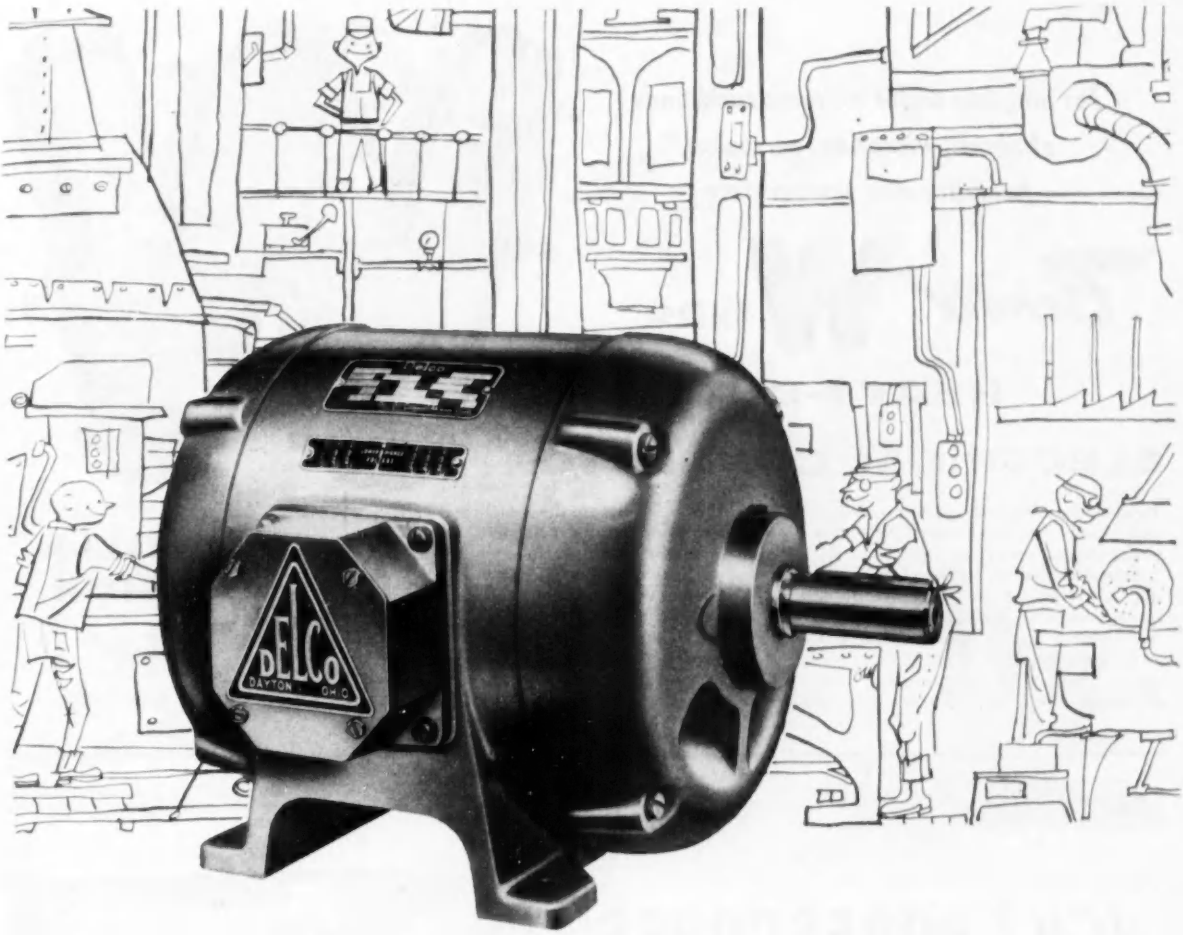
Any mechanical product can un-sell itself if not used properly. Graphic, detailed instruction and maintenance manuals assure repeat sales and reduce costly service calls. Oxford offers you many grades, suitable for each service book requirement. Ask your Oxford Merchant to show you successful examples.


*Get your copy of the new Oxford Paper Selector Chart—a time-saving master guide to the right grade for each purpose. Ask your nearby Oxford Merchant or write us direct.*

# Oxford Papers

## Help Build Sales

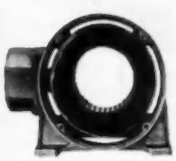
OXFORD PAPER COMPANY, *230 Park Avenue, New York 17, N. Y.* • OXFORD MIAMI PAPER COMPANY, *35 East Wacker Drive, Chicago 1, Ill.*
*Mills at Rumford, Maine, and West Carrollton, Ohio*




*Here's a new line of...* **DELCO**

## OPEN BALL-BEARING MOTORS

Corrosive-resistant cast iron frame. Exclusive cotton and varnish insulation for permanent flexibility and long life.



Grease-lubricated shielded and sealed ball bearings are positioned to maintain permanent shaft alignment.

Rotor is die-cast aluminum, dynamically balanced in unit with shaft to reduce vibration.

New NEMA frame sizes—the major design feature of these greatly improved Delcos—offer users more power in less space, with less noise, less weight, and better appearance. Yet with all these new advantages, there's no sacrifice of performance or electrical characteristics! These are the motors you can order *now* in frame sizes 182 and 184—and get in a hurry. Larger frame sizes—to 326—will be available later. Also, there are new totally-enclosed fan-cooled motors in frame sizes 182 and 184 available now. These two new lines are compact . . . lightweight . . . quiet.

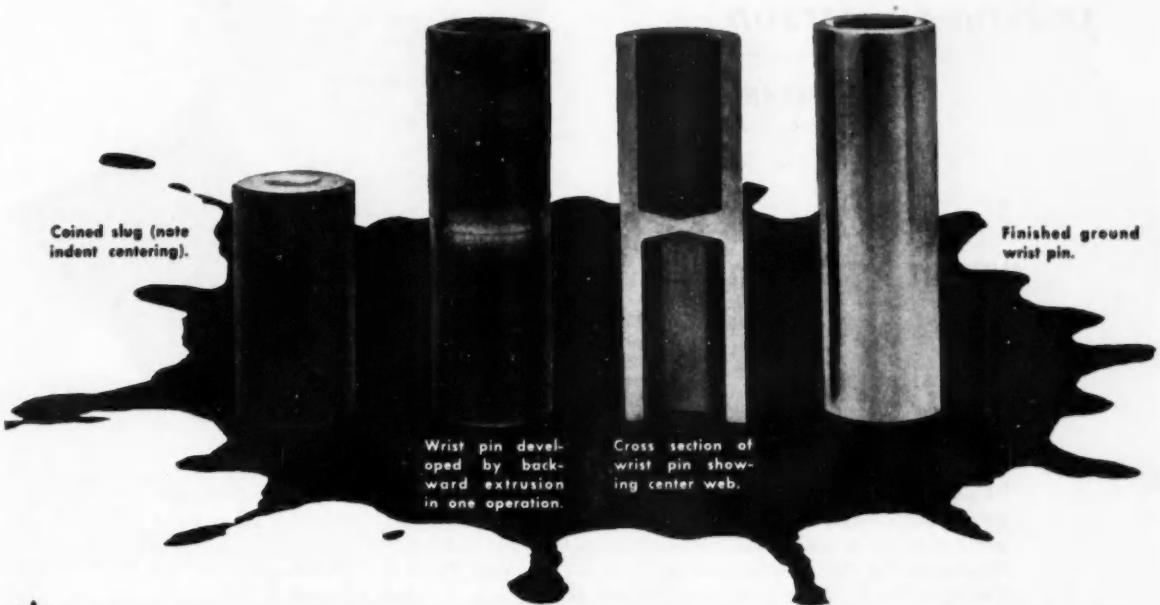
**Previous frame sizes will continue to be available**

**DELCO PRODUCTS**
DIVISION OF GENERAL MOTORS CORPORATION
DAYTON 1, OHIO

A GENERAL MOTORS PRODUCT — A UNITED MOTORS LINE

**DISTRIBUTED BY WHOLESALERS EVERYWHERE**

# *Bonderite




## *as a separating layer and lubricant carrier is the key to the success of COLD FORMING

Present day deep draws and cold extrusions were labeled "impossible" just a few years ago. Tool design, production techniques and lubrication have improved. Especially lubrication.

Treatment with Bonderite and Bonderlube has been the key to successful production of extruded parts large and small.

Investigate extrusion, using Bonderite and Bonderlube. Get savings through less expensive raw materials, reduction of scrap, improved physicals, less machining, reduced operations.

Draw on Parker's unique store of knowledge and experience in extrusion. Call in the Parker representative.

*Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

**Send for your FREE copy on company letterhead.**

*"The Influence of Proper Lubrication on the Design of Cold Extruded Components." Illustrated, detailed, authoritative discussion by two Parker extrusion experts.*

*Since 1915—leader in the field*

# PARKER
## RUST PROOF COMPANY

*2178 E. Milwaukee, Detroit 11, Michigan*

| BONDERITE | BONDERITE and BONDERLUBE | PARCO COMPOUND | PARCO LUBRITE |
|---|---|---|---|
| corrosion resistant paint base | aids in cold forming of metals | rust resistant | wear resistant for friction surfaces |

## *"...through a person-to-person canvass..."*

**ROBERT S. MACFARLANE**
*President*
*Northern Pacific Railway Company*

***"Combine a good product with enthusiastic salesmanship, capably directed, and favorable results are reasonably certain. This winning combination through a person-to-person canvass recently added more than 8,000 employees of the Northern Pacific Railway to the Payroll Savings Plan for purchase of U. S. Savings Bonds. It is gratifying to me that the organized efforts of Northern Pacific personnel not only have resulted in substantially increased systematic saving and a greater investment in America's future by our employees, but that the Treasury Department is using our campaign as an example throughout the railroad industry in its efforts to step up regular purchases through payroll deductions."***

The U. S. Savings Bond *is* a good product . . . Payroll Savers *are* enthusiastic Bond Salesmen . . . company spirit *was* good because everybody on the Road knew that Mr. Macfarlane was 100% behind the effort to increase employee participation in Northern Pacific's Payroll Savings Plan.

But, there was still another, and very important, factor in the success of Northern Pacific's campaign that added more than 8,000 new Payroll Savers — a Person-to-Person Canvass.

A good Person-to-Person Canvass is an organized employee effort that puts a Payroll Savings Application Blank in the hands of every man and woman in the company. There is no pressure, no drive to "sign up." Every employee is free to make his own decision. That's all there is to a Person-to-Person Canvass, but in literally thousands of companies, as on the Northern Pacific, a high percentage of employees *want* to build their personal security and are quick to join the Payroll Savings Plan when its availability and many advantages are brought to their personal attention.

Upwards of 8,000,000 employed men and women are enrolled in the Payroll Savings Plan, most of them as a result of Person-to-Person Canvasses. Each month these Payroll Savers invest more than $160,000,000. The 1954 goal is 9,000,000 Payroll Savers. It can be reached if you and other executives will take a personal interest in the Plan and what it means to your employees, your company and your country.

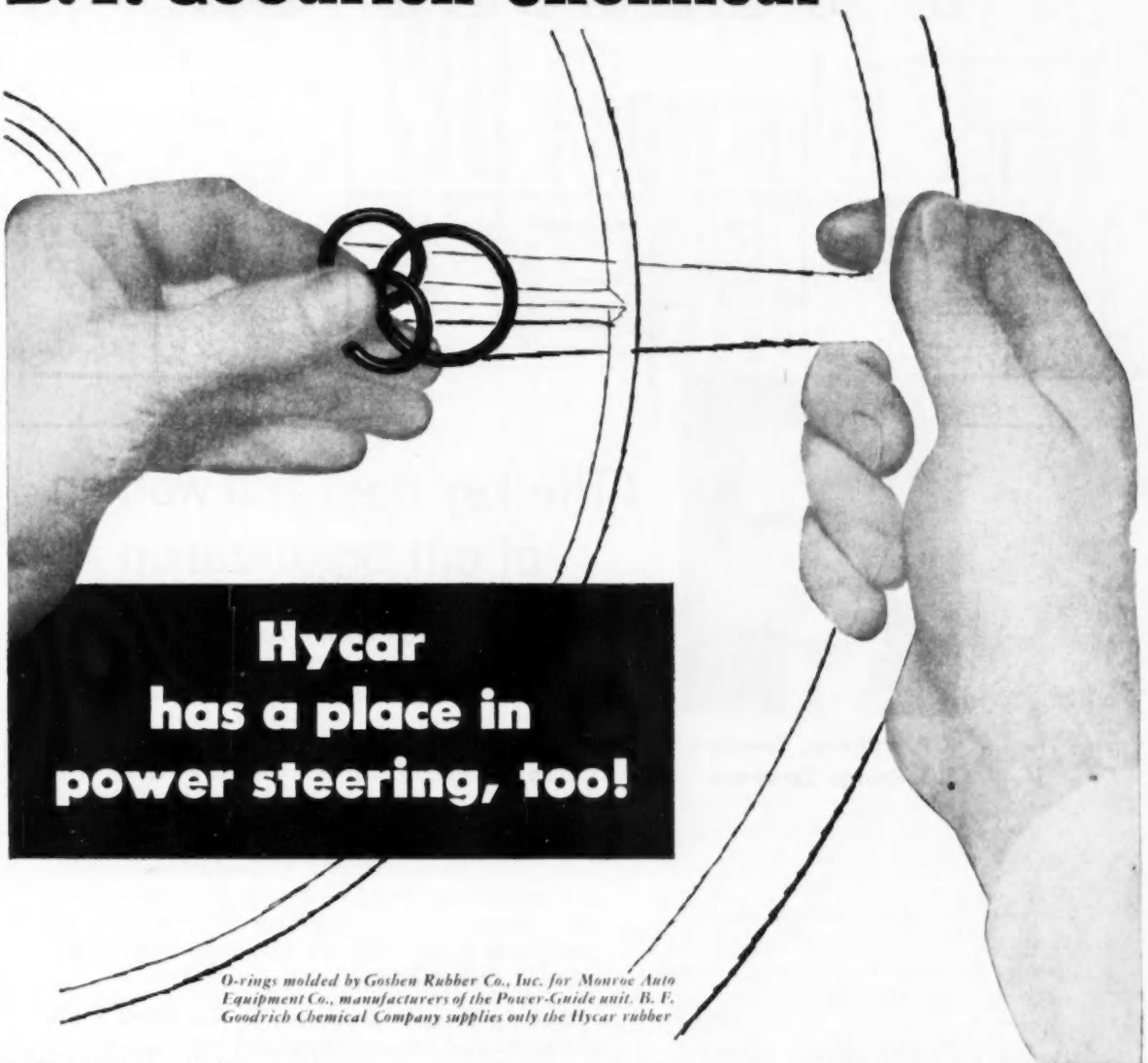
If your company has the Payroll Savings Plan your State Director will be glad to help you organize a Person-to-Person Canvass that should increase employee participation to 50%, 60% or more. If you do not have a plan he will show you how easy it is to install one. Write to Savings Bond Division, U. S. Treasury Department, Washington, D. C.

*The United States Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and*

**AUTOMOTIVE INDUSTRIES**

***Another new development using***

# B. F. Goodrich Chemical *raw materials*



## Hycar has a place in power steering, too!

*O-rings molded by Goshen Rubber Co., Inc. for Monroe Auto Equipment Co., manufacturers of the Power-Guide unit. B. F. Goodrich Chemical Company supplies only the Hycar rubber*

BEHIND the thrilling performance of Monroe Power-Guide power steering is a unit that's a marvel of engineering design—and O-rings made of Hycar American rubber help assure its efficient, safe operation.

The Hycar O-rings are mounted on the pistons and valve spool to maintain a tight seal between these parts and the hydraulic cylinder in which they move. They maintain the proper flow of hydraulic fluid and prevent leakage around the strategic parts of the unit.

Hycar was chosen for the O-rings because it has low compression set characteristics and retains its strength and flexibility after prolonged exposure to hydraulic fluid at temperatures up to 300°F. The O-rings are molded from a Hycar rubber compound which exceeds the requirements of specifications SB-715ABE$_1$E$_3$F, SB720ABE$_1$E$_3$F and AMS 3206.

Hycar's advantages make it ideal for many jobs where resistance to heat, cold, abrasion, gas, oil and many chemicals is important. Let's talk over your product problems or requirements and see where Hycar can help. For technical information, please write Dept. HG-4, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

**B. F. Goodrich Chemical Company**
A Division of The B. F. Goodrich Company

**Hycar** Reg. U.S. Pat. Off.
*American Rubber*

**GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON colors**

# S. S. KRESGE CO.

**F. P. Williams, President**
**S. S. Kresge Company**

## "The key men and women of our organization

*regularly and thoroughly read Business Publications ...especially articles covering business trends in merchandise and developments in the retail variety field."*

To carry Mr. Williams' thought a step further, men and women who have to keep their thinking a step ahead of their work have one common characteristic. They read thoroughly the publications that give them the most help.

Just as the Kresge executives follow their business publications for trends and developments in the lines of their special interests, so leaders in every field of business and professional activity study each issue of the business periodicals in their own fields.

Such regular and thorough reading is a tribute to the ability of editors and special writers to think in terms of tomorrow. Regular and thorough readership means, too, that *the advertising pages of the Business Press form a direct sales channel for products and services that are sold to business and professional men.*

NBP

**NATIONAL BUSINESS PUBLICATIONS, INC.** 1001 Fifteenth Street, N. W., Washington 5, D. C. • STerling 3-7535

*The national association of publishers of 165 technical, professional, scientific, industrial, merchandising and marketing magazines, having a combined circulation of 3,849,056... audited by either the Audit Bureau of Circulations or Business Publications Audit of Circulation, Inc.... serving and promoting the Business Press of America... bringing thousands of pages of specialized know-how and advertising to the men who make decisions in the businesses, industries, sciences and professions... pin-pointing your audience in the market of your choice. Write for list of NBP publications and the latest "Here's How" booklet, "How We Use the Business Press and Why" by William C. Sproull, Director of Advertising of the Burroughs Corp., Detroit.*

# We know a lot about You

WE HAVE your name — and your address. We know what kind of car you drive — and how old it is. We know *how many* cars you own. And what kind and how old they are.

From what we know about you, we — and others — can pretty well judge how good a prospect you are for, say, an electronic organ. Or a new clothes dryer. Or a 3-D camera. Or almost any product or service that anyone has for sale to consumers.

But you are only one in 39 million! To be more exact, we know as much about 38,977,423 other people as we know about you.

These people are your best prospects. They are all the car and truck owners in this country. Marketing analysts tell us that they account for somewhere between 80% and 90% of the U.S. total retail purchases. And the facts about them *are compiled anew every year* from the records of all the states.

Because we know so much about so many, we can provide for your advertising messages the circulation most accurately fitted to your — and your dealers' — particular needs. This circulation will consist *entirely of these best prospects.* It can be as large or as small as you require. It can be chosen by neighborhood, by city, by county, by state. It can include owners of all car makes for all model years registered — or owners only of selected makes for selected years.

Now that it is necessary to go out after the retail business that is no longer walking in, it is extremely important that your advertising establish direct contacts between your retail outlets and your best prospective customers. By picking out the people most likely to buy, this highly selective circulation, together with Polk's unmatched direct mail distribution facilities, keeps your advertising on target . . . with each advertisement carrying a single retailer's name and address . . . and circulated only in his sales area.

If you want your advertising dollars to buy more selling power, let's talk things over. Drop us a line.

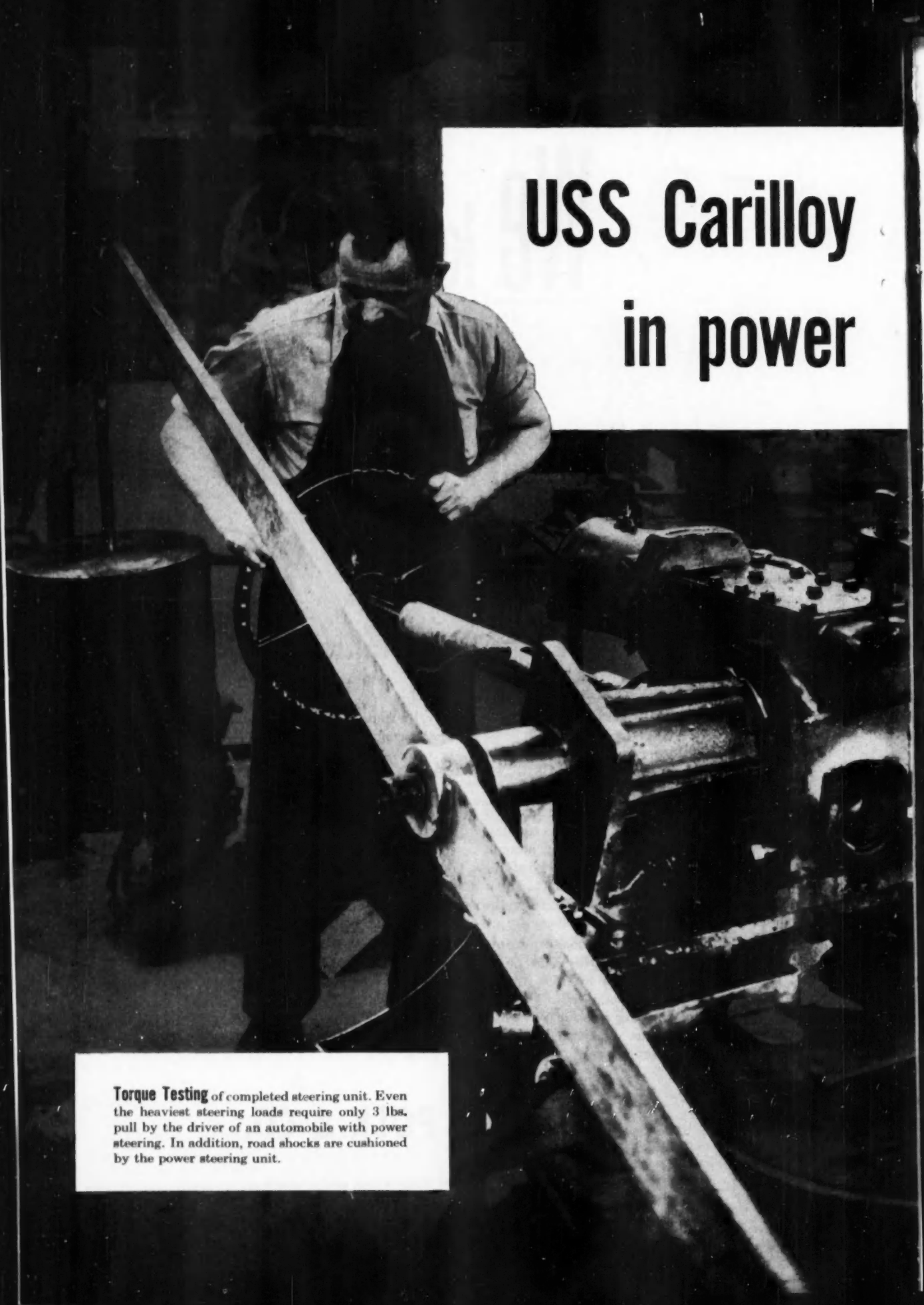
NEW YORK
CHICAGO
PHILADELPHIA
CLEVELAND
ST. LOUIS

**R. L. POLK & CO.**

DIRECT MAIL ADVERTISING PUBLISHERS

431 Howard Street • Detroit 31, Michigan

# USS Carilloy in power



**Torque Testing** of completed steering unit. Even the heaviest steering loads require only 3 lbs. pull by the driver of an automobile with power steering. In addition, road shocks are cushioned by the power steering unit.

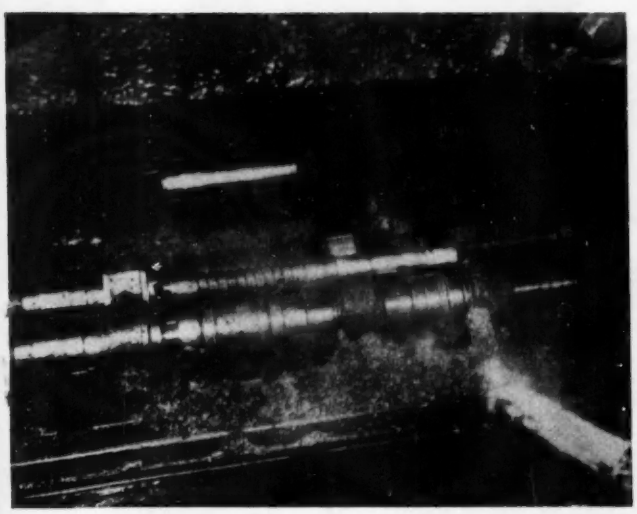
# steels minimize distortion steering units for cars

POWER steering units are precision machines. Every part must fit exactly. Parts must be interchangeable. They must be made to finished tolerances as small as .0001". They must be heat treated with minimum distortion.

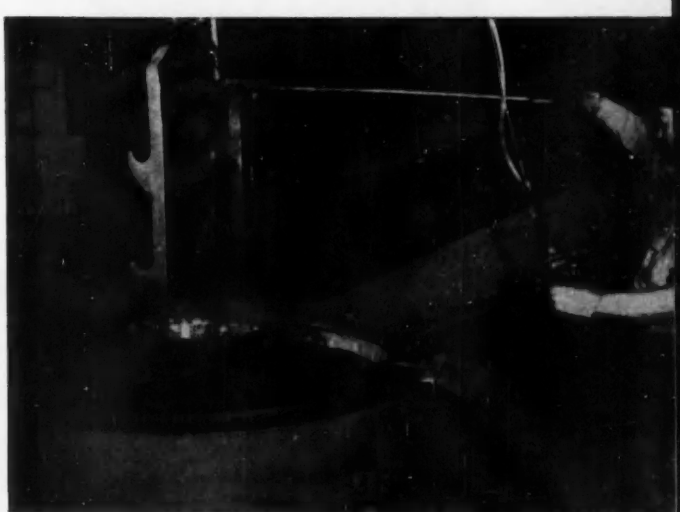
These rigid requirements dictate the use of accurately controlled *alloy* steels that can be *quenched in oil.* These steels must respond uniformly to heat treatment, time after time, so that many thousands of parts can be made—*all exactly alike.* USS CARILLOY steels are used extensively in power steering units because they help to insure the uniformity that is essential in all critical parts.

CARILLOY steels are giving excellent service daily in a wide variety of precision parts for automobiles, aircraft, trucks, farm equipment, construction machinery, rotating machines, and many other applications. These high quality steels are meeting some of the toughest requirements known to industry. They can meet yours. Write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

UNITED STATES STEEL CORPORATION, PITTSBURGH · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



**Worm Shafts** are ground to within .0005". Alloy steel must be used for these parts so they can be quenched in oil with a minimum of distortion to maintain the close tolerances.



**Heat Treatment** USS CARILLOY steels have the uniformity in response to heat treatment that is so necessary to obtain the high strength, adequate ductility and minimum of distortion required in power steering units.

Carilloy USS Steels

ELECTRIC FURNACE OR OPEN HEARTH

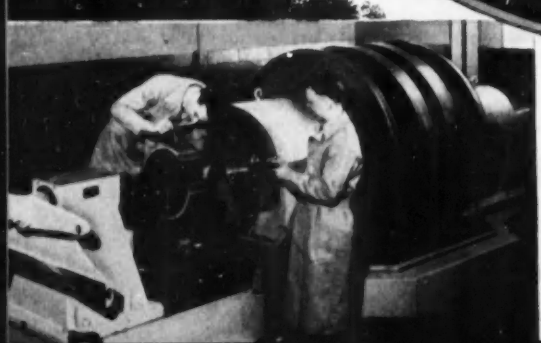
COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

4-16

UNITED STATES STEEL

# TIMKEN-DETROIT
# A REVOLUTIONARY NEW

***For trucks, trailers, hoists, tractors, harvesters, cranes, buses,***



## Pre-proved in "Torture Tests"

Here's where TDA brakes are run through exhaustive tests on brake dynamometers in the world's most exacting "Torture Chamber." New materials and design features are constantly being tested and developed for use in every type of product. Also, field tests are performed on all types of brake applications under every conceivable operating condition.

# ANNOUNCES ALL-PURPOSE BRAKE!

## *shovels, mixers, machinery, etc.*

### THIS BRAKE ALONE OFFERS YOU THESE 7 ADVANTAGES!

**1** **NEW SIMPLICITY!** Only 8 simple parts. Shoes and springs are completely interchangeable. For instance – brake shoes can be "slapped in." Position of the shoes makes no difference . . . it's *impossible* to install them incorrectly. Simplifies stocking – only 6 different parts required to completely replace the brake.

**2** **NO LUBRICATION REQUIRED!** Maintenance reduced to the absolute minimum. No skilled help needed because it's "fool proof" to service and install. No inside adjustment necessary.

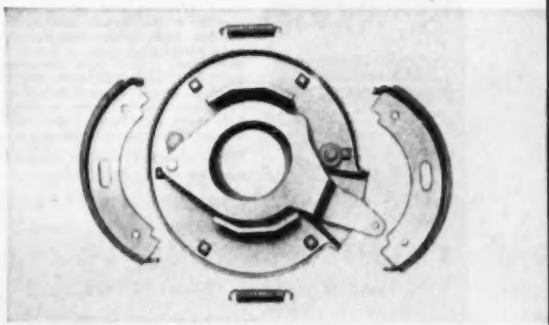
**3** **ENCLOSED DESIGN** – protects against dust, dirt, water, contamination. Prolongs brake life, reduces fire hazard.

**4** **LIGHTEST WEIGHT!** This new development by TDA is in a class by itself. For example: the 13-inch drum size weighs only 40 lbs. as against 80 lbs. for an ordinary band brake!

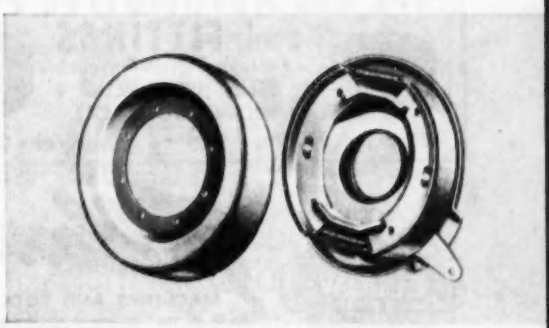
**5** **LESS COST!** These brakes use lightweight stamped steel shoes of new design as against ordinary heavy, more costly cast shoes. Wear longer with increased braking power.

**6** **NEW BALANCED-TYPE DESIGN!** Exerts equal torque – in both directions. Balanced pressure makes both shoes do same amount of work. Brake linings have uniform wear pattern . . . constant, smooth performance.

**7** **FIVE TIMES LONGER BRAKE LINING WEAR,** proved in actual road and work tests. This means less maintenance costs for operators . . . less inventory to stock. For instance: one manufacturer plans to use *three* of these new brakes to replace *five* types now employed.



Look how simple it is! No tricky assembly. Just remove two springs and lift out shoes. Anyone can put it together in minutes. No adjustment of brake required.



Here's the combination that gives this brake its outstanding superiority. Fewer parts to wear, to stock—longer life —less maintenance—lower cost.

### FREE! JUST OUT—HOW TDA CAN HELP YOU SOLVE YOUR BRAKING PROBLEMS!

Complete new literature now available on this revolutionary new brake. The result of 50 years of Timken-Detroit engineering experience . . . available in all sizes, for any type of work.

If somewhere in your business there is a special braking problem, big or small, we urge you to call on the ingenuity and vast knowledge of TDA engineers to solve it quickly – at low cost and without obligation. An inquiry on your company letterhead will receive immediate attention. Take advantage of this money-saving service now. Just write Timken-Detroit Brake Division, Ashtabula, Ohio.

TIMKEN *Detroit* BRAKES

TIMKEN DETROIT BRAKE DIVISION
ROCKWELL SPRING AND AXLE COMPANY
ASHTABULA, OHIO

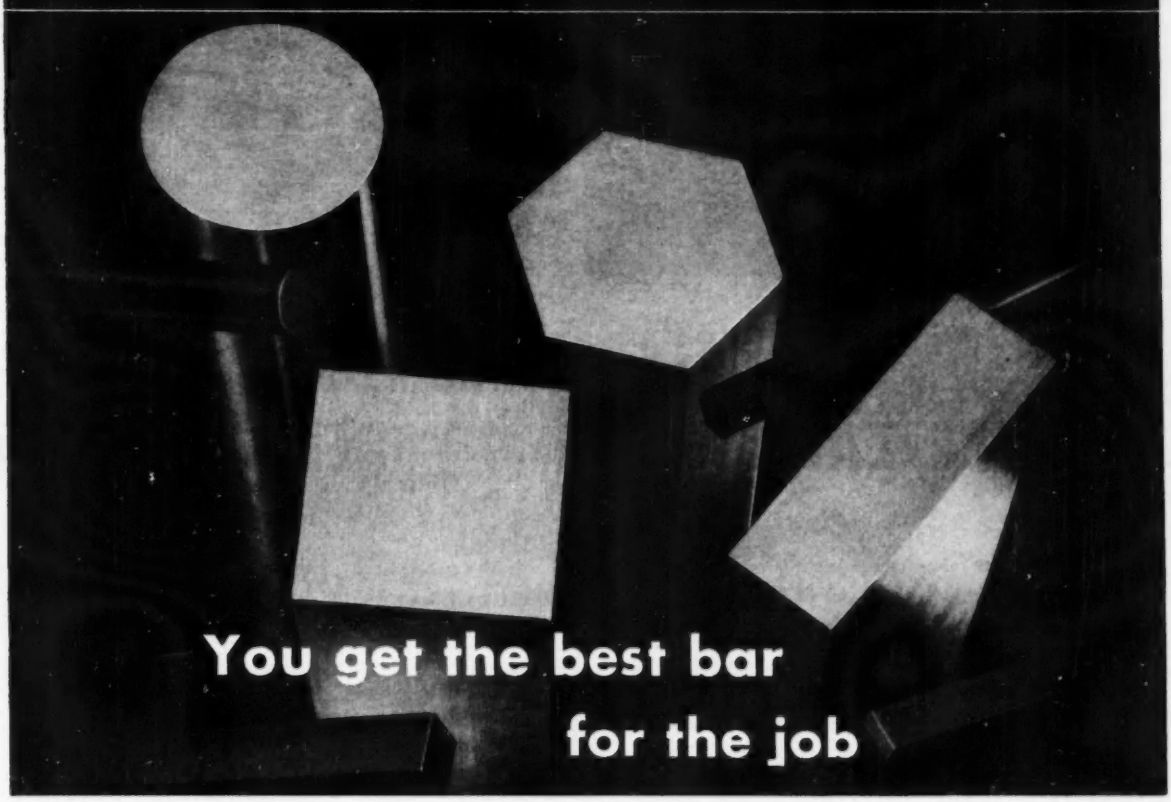
The Accepted TDA Standard

TRADE MARK REGISTERED

# Index to Advertisers

This Advertisers' Index is published as a convenience, and not as part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert.

# WHY IT PAYS TO BUY COLD FINISHED BARS FROM US




• Our experienced technical staff will help you determine what grade of cold finished bar would best help cut costs in *your* shop. Often, you can realize great savings by not overbuying quality . . . the best bar for the job is *not* necessarily the most expensive.

The large, ready-to-deliver stocks in all our warehouses include a wide variety of types in the sizes and shapes most commonly used. These cold finished bars are produced under exacting quality control by the world's foremost steel manufacturer —United States Steel.

When you want the best in cold finished bars, combined with sound technical assistance and prompt delivery, call your nearest U. S. Steel Supply warehouse. We carry: cold finished rounds, squares, hexagons, flats and precision shafting in all grades; cold finished screw stock, Bessemer rounds, "MX" high speed screw stock.

**TRIPLE SECURITY**

**What** you want
**When** you want it
**At the right price**

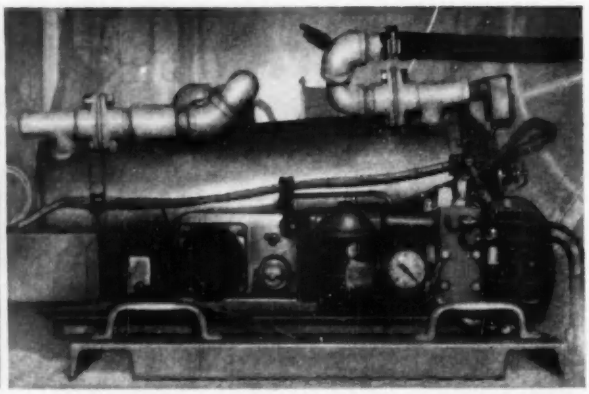
## U. S. STEEL SUPPLY
**DIVISION**

*General Offices*
**208 So. La Salle St., Chicago 4, Ill.**

**Warehouses and Sales Offices Coast to Coast**

USS STEEL — UNITED STATES STEEL

UNITED STATES STEEL



## TYPE 0-6 CRASH TRUCK plus JANITROL LIQUID HEATER equals

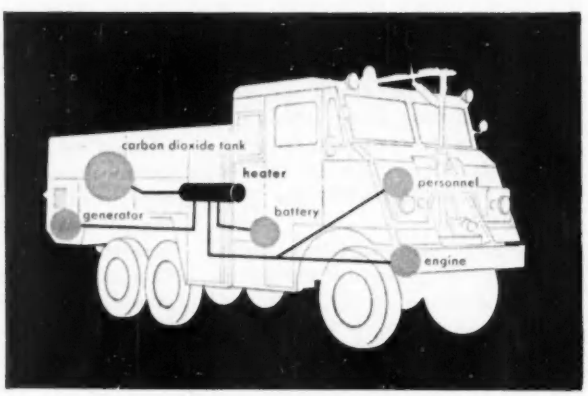
# WINTERIZATION TO 65° BELOW ZERO

It takes just fifteen minutes for two men to install and connect, or disconnect and remove the Janitrol Liquid Heater equipped "winterization kit" in the Air Forces new Type 0-6 Cardox Crash Truck.

Cardox engineers took full advantage of Janitrol unit design accessibility . . . added a coolant pump, hand bypass pump, electrical over-ride connections, and an aluminum channel-iron skid base to come up with the ultimate in changeover speed. Just six quick-disconnect couplings tie coolant flow—electric supply—and fuel supply to the permanently installed winterization system within the truck. Operating controls are installed in the truck cab.

*The Janitrol heater provides 90,000 Btu/hr for engine block, engine pan, battery box, radiator, cab and body, defrosting, a motor generator set, and the Cardox pressure vessel heating. Complete insurance against winter operating failures caused by freeze-ups!*

*Look into Janitrol Liquid Heaters' long record of dependability under all conditions—and you'll specify "Janitrol" for vehicle heat wherever and whenever needed.*




HEAT WHEREVER YOU WANT IT

**Janitrol**

AIRCRAFT-AUTOMOTIVE DIVISION, SURFACE COMBUSTION CORP., COLUMBUS 16, OHIO

DISTRICT ENGINEERING OFFICES: NEW YORK, 225 BROADWAY; WASHINGTON, D. C., 4650 EAST-WEST HIGHWAY; KANSAS CITY, 2201 GRAND AVE.; FORT WORTH, 2509 BERRY ST.; HOLLYWOOD, CALIF., 7046 HOLLYWOOD BLVD.; COLUMBUS, OHIO, 400 DUBLIN AVE.

## Sensational Piston Performance

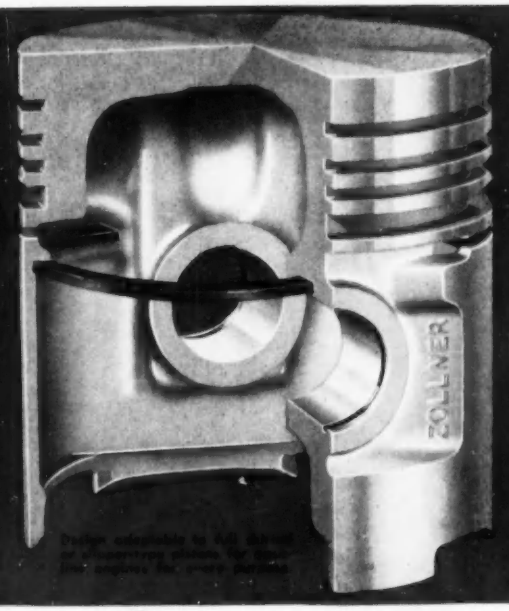
# UNIFORM CLEARANCE AT ALL TEMPERATURES

**STEEL TENSION MEMBER**

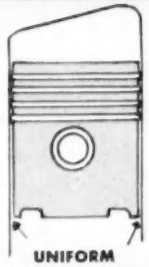
**Anchored only at pin bosses and cast in positive contact with I. D. of piston skirt**

**Controls Clearance Automatically**

ZOLLNER CLEAR-O-MATIC PISTONS




Now, pistons may be fitted to closer clearances than ever before possible. The sensational development of CLEAR-O-MATIC Pistons by Zollner engineers *reduces required clearance to less than .001 with constant uniformity of skirt bearing over the entire temperature range.* Performance results are spectacular. Engines run quietly with no cold slap. Friction is reduced without loss of durability or heat conductivity. There is no danger of scuffing or seizing. The Zollner designed steel tension member incorporates in the aluminum piston the same effective expansion as the ferrous cylinder itself. We urge your immediate test of these sensational advantages for your engine.



**UNIFORM EFFECTIVE SKIRT CLEARANCE AT ALL TEMPERATURES**

1. Clearance maintained uniformly at all coolant temperatures from 20° below zero to 200° F.
2. Effective expansion identical with ferrous cylinder.
3. Steel tension member, with same effective expansion as cylinder, maintains uniform skirt clearance through entire temperature range.
4. Normal diametric clearance usually less than .001 with uniform skirt bearing.
5. Durability and conductivity comparable to heavy duty design.

ZOLLNER PISTONS

THE ORIGINAL EQUIPMENT PISTONS

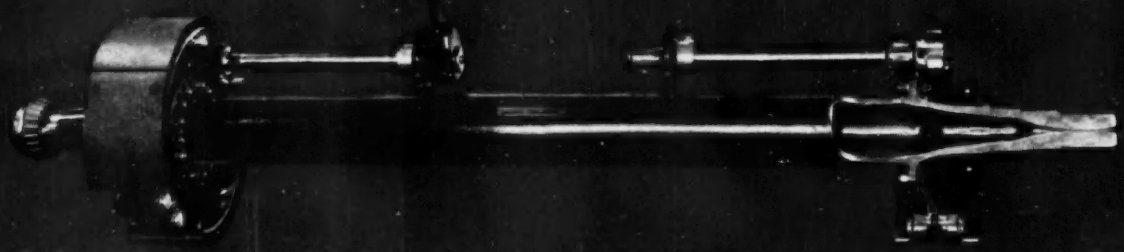
# ZOLLNER

ZOLLNER MACHINE WORKS · Fort Wayne, Indiana

- ADVANCED ENGINEERING
- PRECISION PRODUCTION

in cooperation with engine builders

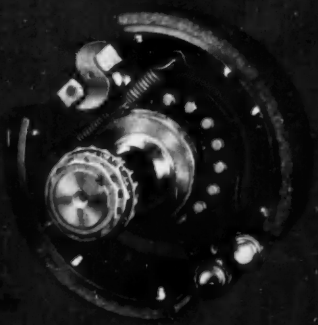
# SHULER *One-Piece* AXLES are the LIGHTEST and STRONGEST YOU CAN BUY!



**Even including their substantial, malleable brake shoes, they are lighter, stronger and more durable!**

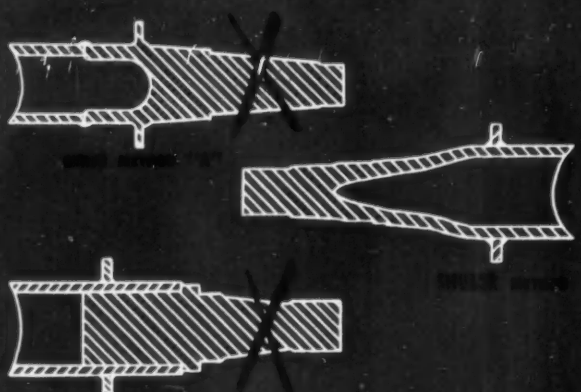
## NEW 1954 MODELS INCLUDE:

1
2
3
4
5
6



## THICKER, BETTER, REPLACEABLE LININGS

1
2
3



**SHULER AXLE COMPANY, Incorporated, LOUISVILLE, KENTUCKY**

SUBSIDIARY OF FULLER MANUFACTURING COMPANY

SALES OFFICES in DETROIT, CHICAGO, OAKLAND and FORT WORTH

WEST COAST WAREHOUSE
Oakland, California

SOUTHWEST WAREHOUSE
Fort Worth, Texas

Shuler Axle Company
2920 Second Street, Louisville, Kentucky

Gentlemen:

Without obligation, please send me your brochure on Shuler One-Piece Trailer Axles.

Name_____

Firm_____

Address_____